



# **STIC Search Report**

## **EIC 1700**

**STIC Database Tracking Number: 208792**

**TO: Shermanda Williams**  
**Location: REM 6D58**  
**Art Unit : 1745**  
**November 29, 2006**

**Case Serial Number: 10/821323**

**From: Ross Shipe**  
**Location: EIC 1700**  
**REMSSEN 4B28**  
**Phone: 571/272-6018**  
**Ross.Shipe@uspto.gov**

### **Search Notes**

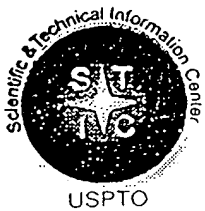
Dear Examiner Williams:

Please review the attached search results.

If you have any questions or if you would like to refine the search query, please feel free to contact me at any time.

Thank you for using EIC 1700 search services!

Ross Shipe (ASRC)  
Technical Information Specialist



# STIC Search Results Feedback Form

**EIC17000**

Questions about the scope or the results of the search? Contact *the EIC searcher* or contact:

Kathleen Fuller, EIC 1700 Team Leader  
571/272-2505 REMSEN 4B28

## Voluntary Results Feedback Form

- I am an examiner in Workgroup:  Example: 1713  
➤ Relevant prior art **found**, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature  
(journal articles, conference proceedings, new product announcements etc.)

➤ Relevant prior art **not found**:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to EIC1700 REMSEN 4B28

Access DB# 20892**SEARCH REQUEST FORM**

Scientific and Technical Information Center

Requester's Full Name: William Examiner #: \_\_\_\_\_ Date: 11/29/02  
Art Unit: \_\_\_\_\_ Phone Number 30 \_\_\_\_\_ Serial Number: 1082323  
Mail Box and Bldg/Room Location: \_\_\_\_\_ Results Format Preferred (circle): PAPER DISK E-MAIL

**If more than one search is submitted, please prioritize searches in order of need.**

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Positive electrode active material

Inventors (please provide full names): \_\_\_\_\_

Earliest Priority Filing Date: \_\_\_\_\_

*\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

**STAFF USE ONLY**

\*\*\*\*\*

	Type of Search	Vendors and cost where applicable
Searcher: <u>205</u>	NA Sequence (#) _____	STN <u>✓</u>
Searcher Phone #: _____	AA Sequence (#) _____	Dialog _____
Searcher Location: _____	Structure (#) _____	Questel/Orbit _____
Date Searcher Picked Up: _____	Bibliographic <u>✓</u>	Dr. Link _____
Date Completed: <u>11/29/02</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>30</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>111</u>	Other _____	Other (specify) _____

**Banks, Kendra**

208772

**From:** SHERMANDA WILLIAMS [shermada.williams@uspto.gov]  
**Sent:** Tuesday, November 28, 2006 3:14 PM  
**To:** STIC-EIC1700  
**Subject:** Database Search Request, Serial Number: 10/821,323

**Requester:**  
SHERMANDA WILLIAMS (P/1745)  
**Art Unit:**  
GROUP ART UNIT 1745  
**Employee Number:**  
82009  
**Office Location:**  
REM 06D58  
**Phone Number:**  
(571)272-8915  
**Mailbox Number:**

SCIENTIFIC REFERENCE BR  
Sci & Tech Inf - Cnt

NOV 29 RECD

**Case serial number:**  
10/821,323  
**Class / Subclass(es):**  
429/239  
**Earliest Priority Filing Date:**  
4/11/2003  
**Format preferred for results:**  
Paper  
**Search Topic Information:**  
Search on claims:

Pat. & T.M. Office

particles of lithium nickel compound oxide coated with a lithium titanium compound oxide; weight ratio of the lithium nickel oxide to the lithium titanium oxide is between 96:4 and 65:35; coated particle size or diameter is 5 to 20 micrometers; lithium titanium oxide has a spinel structure in the cubic system; battery using the particle or material as positive electrode active material

**Special Instructions and Other Comments:**  
2-8915

WHAT IS CLAIMED IS:

1. A positive electrode active material comprising:  
particles having a layered structure,  
the particles comprising:  
a first compound oxide of lithium and nickel; and  
coating layers formed on at least parts of the  
surfaces of the particles,  
the coating layers comprising:  
a second compound oxide of lithium and titanium.
2. The positive electrode active material according to  
claim 1, wherein the ratio by weight of the first compound  
oxide to the second compound oxide is between 96:4 and 65:35.
3. The positive electrode active material according to  
claim 1, wherein the second compound oxide has a spinel  
structure in the cubic system.
4. The positive electrode active material according to  
claim 1, wherein the positive electrode active material has  
a mean particle diameter of 5 to 20  $\mu\text{m}$ .
5. A non-aqueous electrolyte secondary battery  
comprising a positive electrode active material and a

negative electrode active material,

wherein the positive electrode active material  
comprises

particles having a layered structure,

the particles comprising:

a first compound oxide of lithium and nickel; and

coating layers formed on at least parts of the  
surfaces of the particles,

the coating layers comprising:

a second compound oxide of lithium and titanium.

ABSTRACT OF THE DISCLOSURE

A positive electrode active material includes particles composed of a compound oxide; and coating layers composed of a compound oxide formed on at least parts of the surfaces of the particles. The particles have a layered structure and include a first compound oxide mainly composed of lithium and nickel. The coating layers include a second compound oxide mainly composed of lithium and titanium. The ratio by weight of the first compound oxide to the second compound oxide is between 96:4 and 65:35. The positive electrode active material has a mean particle diameter of 5 to 20  $\mu\text{m}$ .

=> d his full

(FILE 'HOME' ENTERED AT 13:21:35 ON 29 NOV 2006)

FILE 'HCAPLUS' ENTERED AT 13:29:51 ON 29 NOV 2006

E US20040201948/PN

L1 1 SEA ABB=ON PLU=ON US2004201948/PN  
SEL RN

FILE 'REGISTRY' ENTERED AT 13:30:17 ON 29 NOV 2006

L2 14 SEA ABB=ON PLU=ON (116327-68-5/BI OR 118819-40-2/BI OR  
12031-82-2/BI OR 12031-95-7/BI OR 12163-02-9/BI OR  
13463-67-7/BI OR 144973-42-2/BI OR 193215-53-1/BI OR  
21324-40-3/BI OR 219737-79-8/BI OR 39300-70-4/BI OR  
39302-37-9/BI OR 623-53-0/BI OR 96-49-1/BI)

FILE 'HCAPLUS' ENTERED AT 13:30:34 ON 29 NOV 2006

L3 1 SEA ABB=ON PLU=ON L1 AND L2

FILE 'REGISTRY' ENTERED AT 13:30:40 ON 29 NOV 2006

L4 6570 SEA ABB=ON PLU=ON (LI (L) NI (L) O)/ELS  
L5 5467 SEA ABB=ON PLU=ON (LI (L) TI (L) O)/ELS  
L6 1 SEA ABB=ON PLU=ON 116327-68-5/RN  
L7 1 SEA ABB=ON PLU=ON 118819-40-2/RN  
L8 1 SEA ABB=ON PLU=ON 193215-53-1/RN  
L9 3 SEA ABB=ON PLU=ON L6 OR L7 OR L8  
L10 1 SEA ABB=ON PLU=ON 12031-82-2/RN  
L11 1 SEA ABB=ON PLU=ON 12031-95-7/RN  
L12 1 SEA ABB=ON PLU=ON 12163-02-9/RN  
L13 1 SEA ABB=ON PLU=ON 219737-79-8/RN  
L14 4 SEA ABB=ON PLU=ON L10 OR L11 OR L12 OR L13

FILE 'HCAPLUS' ENTERED AT 13:34:48 ON 29 NOV 2006

L15 650 SEA ABB=ON PLU=ON L4 AND L5  
L16 2754 SEA ABB=ON PLU=ON L9 OR COBALT LITHIUM NICKEL OXIDE#  
OR COBALT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM  
MANGANESE NICKEL OXIDE#  
L17 1097 SEA ABB=ON PLU=ON L14 OR LITHIUM TITANIUM OXIDE# OR  
LI2TIO3 OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE  
TITANIUM OXIDE#  
L18 58 SEA ABB=ON PLU=ON L16 AND L17  
L19 655 SEA ABB=ON PLU=ON L15 OR L18  
L20 QUE ABB=ON PLU=ON (PARTICLE? OR MICROPARTICL? OR  
PARTICULAT? OR DUST? OR GRAIN? OR POWDER?) (L) (COMPOUND#  
OR COMPD? OR COMPN?) (2A) OXIDE#  
L21 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A)  
(COMPOUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L22 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L23 11 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (NICKEL OR NI)  
(L) (L21 OR L22)  
L24 4 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (TITANIUM OR  
TI) (L) (L21 OR L22)  
L25 70956 SEA ABB=ON PLU=ON (PROPORTION? OR RATIO#) (3A) (WT# OR  
WEIGHT#)  
L26 125748 SEA ABB=ON PLU=ON (DIAMETER# OR DIAM#) (S) (M OR  
MICROMETER# OR MICRO (2A) METER#)  
L27 1 SEA ABB=ON PLU=ON L19 AND L21 AND L22  
D SCAN TI  
L28 2 SEA ABB=ON PLU=ON L19 AND (L21 OR L22)  
L29 3 SEA ABB=ON PLU=ON L19 AND L25  
L30 17 SEA ABB=ON PLU=ON L19 AND L26  
L31 QUE ABB=ON PLU=ON (ELECTRODE# OR CATHODE#)  
L32 31 SEA ABB=ON PLU=ON L23 OR L24 OR L27 OR L28 OR L29 OR  
L30  
L33 28 SEA ABB=ON PLU=ON L32 AND L31



L34 27 SEA ABB=ON PLU=ON L33 AND ELECTROCHEM?/SC,SX  
L35 23 SEA ABB=ON PLU=ON L34 AND (1840-2003)/PRY,PY,AY  
D L35 QUE STAT

FILE 'WPIX' ENTERED AT 14:16:13 ON 29 NOV 2006

L36 QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR  
COBALT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM  
MANGANESE NICKEL OXIDE#  
L37 QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3  
OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM  
OXIDE#  
L38 0 SEA ABB=ON PLU=ON L36 AND L37  
L39 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A)  
(COMPOUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L40 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L41 13 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (NICKEL OR NI)  
(L) (L39 OR L40)  
L42 2 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (TITANIUM OR  
TI) (L) (L39 OR L40)  
L43 28 SEA ABB=ON PLU=ON L39 AND L40  
L44 1 SEA ABB=ON PLU=ON L39 AND L40 AND (DIAMETER# OR DIAM#)  
(S) (M OR MICROMETER OR MICRO (2A) METER# OR MICRON#)  
L45 2 SEA ABB=ON PLU=ON L39 AND L40 AND (PROPORTION? OR  
RATIO#) (3A) (WT# OR WEIGHT#)  
L46 41 SEA ABB=ON PLU=ON L41 OR L42 OR L43 OR L44 OR L45  
L47 14 SEA ABB=ON PLU=ON L46 AND (ELECTROD# OR CATHODE#)

FILE 'JAPIO' ENTERED AT 14:45:57 ON 29 NOV 2006

L48 QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR  
COBALT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM  
MANGANESE NICKEL OXIDE#  
L49 QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3  
OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM  
OXIDE#  
L50 0 SEA ABB=ON PLU=ON L48 AND L49  
L51 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A)  
(COMPOUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L52 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L53 6 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (NICKEL OR NI)  
(L) (L51 OR L52)  
L54 1 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (TITANIUM OR  
TI) (L) (L51 OR L52)  
L55 0 SEA ABB=ON PLU=ON L51 AND L52 AND (DIAMETER# OR DIAM#)  
(S) (M OR MICROMETER OR MICRO (2A) METER# OR MICRON#)  
L56 0 SEA ABB=ON PLU=ON L51 AND L52 AND (PROPORTION? OR  
RATIO#) (3A) (WT# OR WEIGHT#)  
L57 7 SEA ABB=ON PLU=ON L50 OR L53 OR L54 OR L55 OR L56  
L58 6 SEA ABB=ON PLU=ON (L50 OR L53 OR L54 OR L55 OR L56)  
AND (ELECTRODE# OR CATHODE#)

FILE 'JICST-EPLUS' ENTERED AT 14:55:46 ON 29 NOV 2006

L59 QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR  
COBALT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM  
MANGANESE NICKEL OXIDE#  
L60 QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3  
OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM  
OXIDE#  
L61 0 SEA ABB=ON PLU=ON L59 AND L60  
L62 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A)  
(COMPOUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L63 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L64 0 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (NICKEL OR NI)  
(L) (L62 OR L63)

L65 0 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (TITANIUM OR  
TI) (L) (L62 OR L63)  
L66 0 SEA ABB=ON PLU=ON L61 OR L64 OR L65

FILE 'COMPENDEX' ENTERED AT 14:59:35 ON 29 NOV 2006

L67 QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR  
COBALT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM  
MANGANESE NICKEL OXIDE#  
L68 QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3  
OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM  
OXIDE#  
L69 0 SEA ABB=ON PLU=ON L67 AND L68  
L70 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A)  
(COMPOUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L71 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L72 0 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (TITANIUM OR  
TI) (L) (L70 OR L71)  
L73 0 SEA ABB=ON PLU=ON (LITHIUM OR LI) (4A) (NICKEL OR NI)  
(L) (L71 OR L72)  
L74 0 SEA ABB=ON PLU=ON L70 AND L71  
L75 0 SEA ABB=ON PLU=ON L69 OR L72 OR L73 OR L74

=> file wpix

FILE 'WPIX' ENTERED AT 15:07:14 ON 29 NOV 2006  
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=> d l47 que stat

L39 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A) (COMP  
OUND? OR COMPD? OR COMPN?) (2A) OXIDE#  
L40 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
COMPD? OR COMPN?) (2A) OXIDE#  
L41 13 SEA FILE=WPIX ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
(NICKEL OR NI) (L) (L39 OR L40)  
L42 2 SEA FILE=WPIX ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
(TITANIUM OR TI) (L) (L39 OR L40)  
L43 28 SEA FILE=WPIX ABB=ON PLU=ON L39 AND L40  
L44 1 SEA FILE=WPIX ABB=ON PLU=ON L39 AND L40 AND (DIAMETER#  
OR DIAM#) (S) (M OR MICROMETER OR MICRO (2A) METER# OR  
MICRON#)  
L45 2 SEA FILE=WPIX ABB=ON PLU=ON L39 AND L40 AND (PROPORTION  
? OR RATIO#) (3A) (WT# OR WEIGHT#)  
L46 41 SEA FILE=WPIX ABB=ON PLU=ON L41 OR L42 OR L43 OR L44  
OR L45  
L47 14 SEA FILE=WPIX ABB=ON PLU=ON L46 AND (ELECTROD# OR  
CATHODE#)

=> file wpix

FILE 'WPIX' ENTERED AT 15:07:26 ON 29 NOV 2006  
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=> d l47 full 1-14

L47 ANSWER 1 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
AN 2006-273000 [28] WPIX  
DNC C2006-089241 [28]  
DNN N2006-233180 [28]  
TI Light emitting element for electronic appliance, e.g. video camera,  
includes two electrodes, and three layers each comprising organic  
compound and inorganic compound  
DC L03; U14

IN IKEDA H; KUMAKI D; SAKATA J; SEO S; YAMAZAKI S  
 PA (SEME-C) SEMICONDUCTOR ENERGY LAB  
 CYC 110  
 PI WO 2006038573 A1 20060413 (200628)\* EN 56[13]  
 JP 2006128097 A 20060518 (200634) JA 26  
 ADT WO 2006038573 A1 WO 2005-JP18225 20050926; JP 2006128097 A JP  
 2005-286201 20050930  
 PRAI JP 2004-290678 20041001  
 IPCI H01L0051-50 [I,A]; H01L0051-50 [I,A]; H05B0033-12 [I,C]; H05B0033-20  
 [I,A]  
 AB WO 2006038573 A1 UPAB: 20060502  
 NOVELTY - A light emitting element comprises two electrodes, and  
 three layers each comprising organic compound and inorganic  
 compound.

DETAILED DESCRIPTION - A light-emitting element comprises two  
 electrodes (101, 102) and a first layer (111) between the two  
 electrodes. The first layer includes a first organic compound and a  
 first inorganic compound that exhibits an electron accepting  
 property to the first organic compound. A second layer (112) is  
 provided between the first layer and the second electrode.  
 It includes a second organic compound that is luminescent and a  
 second inorganic compound. A third layer (113) is provided between a  
 second layer and the second electrode. It includes a third  
 organic compound and a third inorganic compound that exhibits an  
 electron donating property to the third organic compound.

USE - The light emitting element is used in an electronic  
 appliance from video camera, a digital camera, a goggle-type  
 display, head mount display, a navigation system, a sound  
 reproduction device, an in-car audio system, an audio component, a  
 personal computer, a game machine, a personal digital assistance, a  
 mobile computer, a cellular phone, a portable game machine, an  
 electronic book or an image reproduction device equipped with a  
 recording medium (claimed).

ADVANTAGE - The light emitting element that uses a material  
 in which an organic compound and an inorganic compound are mixed and  
 has a structure different from conventional structures, a light  
 emitting element that uses a material in which an organic compound  
 and an inorganic compound are mixed and decreases in driving  
 voltage, and a light emitting element that uses a material in which  
 an organic compound and an inorganic compound are mixed and easily  
 prevents short circuit.

DESCRIPTION OF DRAWINGS - The diagram illustrates the  
 structure of a light emitting element.

Electrodes (101, 102)  
 Three layers (111-113)

TECH INORGANIC CHEMISTRY - Preferred Component: The metal oxide is a  
 transition metal oxide having a transition metal that belongs to  
 Groups 4-12 of the element. It can also be a metal oxide from  
 vanadium oxide, molybdenum oxide, tungsten oxide, or rhenium  
 oxide. The first inorganic compound is a  
 metal nitride. The second inorganic compound is a metal oxide having  
 a metal that belongs to Groups 13 or 14 of the element. The metal  
 oxide of the second inorganic compound  
 can also be a metal oxide from aluminum oxide, gallium oxide,  
 silicon oxide or germanium oxide. The second  
 inorganic compound is a metal nitride. The third inorganic  
 compound is a metal oxide from an alkali metal oxide, an alkaline  
 earth metal oxide or a rare earth metal oxide. The metal oxide of  
 the third inorganic compound can also be lithium oxide or barium  
 oxide. The third inorganic compound can also be a metal nitride from  
 an alkali metal nitride, an alkaline earth metal nitride or a rare  
 earth metal nitride. The metal nitride is a metal nitride from  
 lithium nitride, magnesium nitride or calcium nitride.  
 ORGANIC CHEMISTRY - Preferred Component: The first organic compound  
 is a hole transporting organic compound. It can also be an organic  
 compound having an aromatic amine skeleton. The third organic

compound is an electron transporting organic compound. It is a chelate metal complex having a chelate ligand including an aromatic ring, an organic compound having a phenanthroline skeleton and an organic compound having an oxadiazole skeleton.

FS CPI; EPI  
MC CPI: L04-C12A; L04-C12B; L04-E03  
EPI: U14-J02D

L47 ANSWER 2 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

AN 2006-131890 [14] WPIX

DNC C2006-045738 [14]

DNN N2006-114107 [14]

TI Anode active material for aqueous lithium **secondary** battery, contains layered **compound** containing complex **oxide of lithium, nickel, cobalt and manganese**

DC L03; X16

IN HIRUTA O; KONDO H; OKUDA C; SASAKI I; TAKEUCHI Y; UKYO Y

PA (TOYW-C) TOYOTA CHUO KENKYUSHO KK

CYC 1

PI JP 2006040571 A 20060209 (200614)\* JA 12[2]

ADT JP 2006040571 A JP 2004-214488 20040722

PRAI JP 2004-214488 20040722

IPCI C01G0053-00 [I,A]; H01M0010-36 [I,A]; H01M0004-58 [I,A]

AB JP 2006040571 A UPAB: 20060227

NOVELTY - An anode active material contains layered compound containing complex oxide of **lithium, nickel, cobalt, manganese** and at least one of magnesium, aluminum, iron, titanium, gallium, copper, vanadium and niobium. The anode active material is used for aqueous lithium secondary battery (1) containing aqueous electrolyte liquid formed by dissolving lithium salt in water.

DETAILED DESCRIPTION - An anode active material contains layered compound of formula:  $\text{Li}_s\text{Ni}_x\text{Co}_y\text{Mn}_z\text{MtO}_2$ . The anode active material is used for aqueous lithium secondary battery containing aqueous electrolyte liquid formed by dissolving lithium salt in water.

$s=0.9-1.2$ ;

$x-z=0.25-0.4$ ;

$t=0-0.25$ ; and

M=magnesium, aluminum, iron, titanium, gallium, copper, vanadium and/or niobium.

An INDEPENDENT CLAIM is included for aqueous lithium secondary battery, which has anode (2) containing anode active material, **cathode** (3) containing **cathode** active material and aqueous electrolyte liquid. The **cathode** active material contains a substance whose occlusion-discharge electric potential with respect to lithium is lower than the layered compound in the anode active material.

USE - For aqueous lithium secondary battery (claimed) used as electric power supply for information communication apparatus such as personal computer, mobile telephone and electric vehicle.

ADVANTAGE - The aqueous lithium secondary battery comprising the anode active material, has excellent charging and discharging cycle characteristics and discharge capacitance.

DESCRIPTION OF DRAWINGS - The figure shows structure of aqueous lithium secondary battery. (Drawing includes non-English language text).

aqueous lithium secondary battery (1)

anode (2)

**cathode** (3)

separator (4)

gasket (5)

TECH INORGANIC CHEMISTRY - Preferred Property: The electrolyte liquid has pH of 6-10.

ABEX DEFINITIONS - Preferred Definitions: -  $x-z=0.3-0.35$ .

EXAMPLE - An aqueous lithium secondary battery comprising cathode, anode and electrolyte liquid formed by dissolving lithium nitrate in water, was formed. The anode contained anode active material comprising  $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2$  and cathode active material contained  $\text{Li}_{1.5}\text{V}_3\text{O}_y$  ( $y=7-8$ ). The cathode active material had low occlusion-discharge electric potential with respect to lithium than anode active material. The battery had excellent charging and discharging cycle characteristics.

FS CPI; EPI

MC CPI: L03-E01B5C

EPI: X16-B01X; X16-E01C1; X16-J02; X16-J07

L47 ANSWER 3 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
 AN 2005-384852 [39] WPIX  
 DNC C2005-119111 [39]  
 DNN N2005-312036 [39]  
 TI Preparation of positive active material for rechargeable lithium battery, by preparing acidic solution with specified acidity, adding lithium-containing compound to acidic solution, and heat-treating the coated lithium-containing compound  
 DC L03; X16  
 IN JUNG W; JUNG W I; KIM G; KIM G B; PARK Y; PARK Y C; SUH; SUH J; SUH J W; CHUNG W I  
 PA (JUNG-I) JUNG W; (KIMG-I) KIM G; (PARK-I) PARK Y; (SMSU-C) SAMSUNG DENKAN KK; (SMSU-C) SAMSUNG SDI CO LTD; (SUHJ-I) SUH J  
 CYC 4  
 PI US 20050118511 A1 20050602 (200539)\* EN 8[1]  
 JP 2005166656 A 20050623 (200541) JA 14 H01M0004-58  
 CN 1622367 A 20050601 (200560) ZH H01M0004-04  
 KR 2005052216 A 20050602 (200641) KO H01M0004-04  
 KR 508941 B 20050817 (200662) KO H01M0004-04  
 ADT US 20050118511 A1 US 2004-996724 20041122; KR 2005052216 A KR 2003-86080 20031129; JP 2005166656 A JP 2004-335157 20041118; CN 1622367 A CN 2004-10097414 20041129; KR 508941 B KR 2003-86080 20031129  
 FDT KR 508941 B Previous Publ KR 2005052216 A  
 PRAI KR 2003-86080 20031129  
 IC ICM H01M0004-04; H01M0004-58  
 ICS C01G0053-00  
 IPCR C01D0015-00 [I,A]; C01D0015-00 [I,C]; C01G0001-02 [I,A]; C01G0001-02 [I,C]; C01G0053-00 [I,A]; C01G0053-00 [I,C]; H01M0010-36 [N,C]; H01M0010-40 [N,A]; H01M0004-02 [N,A]; H01M0004-02 [N,C]; H01M0004-04 [I,A]; H01M0004-04 [I,C]; H01M0004-48 [I,A]; H01M0004-48 [I,C]; H01M0004-50 [I,A]; H01M0004-50 [I,C]; H01M0004-52 [I,A]; H01M0004-52 [I,C]; H01M0004-58 [I,A]; H01M0004-58 [I,C]  
 AB US 20050118511 A1 UPAB: 20051222  
 NOVELTY - A positive active material for a rechargeable lithium battery is prepared by adding first and second compounds to a solvent to prepare an acidic solution with a pH of 0.01-3; adding a lithium-containing compound to the acidic coating solution to coat the lithium-containing compound; and heat-treating the coated lithium-containing compound to form a surface-treatment layer.  
 DETAILED DESCRIPTION - Preparation of a positive active material for a rechargeable lithium battery by adding first and second compounds to a solvent to prepare an acidic solution with a pH of 0.01-3; adding a lithium-containing compound to the acidic coating solution to coat the lithium-containing compound; and heat-treating the coated lithium-containing compound to form a surface-treatment layer comprising a compound of formula  $\text{MXO}_k$ . The first compound forms a double bond with oxygen of a lithium metal oxide, and the second compound includes an element consisting of alkali metals, alkali earth metals, group 13 elements, group 14 elements, transition metals, or rare-earth elements.

M=alkali metals, alkali earth metals, group 13 elements, group 14 elements, transition metals, or rare-earth elements;

X=element that forms a double bond with oxygen;and  
k=2-4.

USE - For preparing a positive active material for rechargeable lithium battery (claimed).

ADVANTAGE - The method provides positive material that exhibits good high temperature swelling characteristics and represses production of lithium carbonate and can produce active materials capable of inhibiting high temperature swelling. It minimizes loss of available lithium and prepares a positive active material without the deterioration of electrochemical characteristics and with good high-temperature swelling characteristics in which volume expansion caused by gas production at high temperatures is reduced.

DESCRIPTION OF DRAWINGS - The figure is a schematic view of a lithium secondary battery.

Negative electrode (2)

Positive electrode (3)

Separator (4)

Battery case (5)

Sealing portion (6)

TECH INORGANIC CHEMISTRY - Preferred Component: The surface-treatment layer further comprises a solid solution comprising an element capable of forming a double bond with an oxygen of a lithium metal oxide, alkali metals, alkali earth metals, group 13 elements, group 14 elements, transition metals, or rare-earth elements. The lithium-containing compound is of formula  $L_xNi_yNl-yO_2-zY_z$  or

$x=0.9-1.1$ ;

$y=0.1-0.9$ ;

$z=0-0.5$ ;

N=Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, or rare-earth elements;

A=O, F, S, or P; and

Y= F, S, or P.

Preferred Composition: The total amount of the element M and the element X is 0.01-10, preferably 1-4 wt.%. The amount of element M is 0.005-5, preferably 0.5-2 wt.%. The amount of the element X is 0.005-5, preferably 0.5-2 wt.%.

Preferred Property: The pH of the acidic coating solution is 0.8-1.3. The molar mixing ratio of the first compound to the second compound is 0.5-2:1-1.2.

Preferred Property: The surface-treatment layer has a thickness of 0.01-2microns. The positive active material has a tapping density of 1-3 g/cc, a pH of 8-13, and a pH of 10-11.5.

Preferred Condition: The heat-treating step is performed at 450-900degreesC for 1-20 hours.

ORGANIC CHEMISTRY - Preferred Component: The surface-treatment layer further comprises a solid solution comprising an element capable of forming a double bond with an oxygen of a lithium metal oxide, alkali metals, alkali earth metals, group 13 elements, group 14 elements, transition metals, or rare-earth elements. The lithium-containing compound is of formula  $L_xNi_yNl-yO_2-zY_z$  or

$x=0.9-1.1$ ;

$y=0.1-0.9$ ;

$z=0-0.5$ ;

N=Al, Ni, Co, Mn, Cr, Fe, Mg, Sr, V, or rare-earth elements;

A=O, F, S, or P; and

Y= F, S, or P.

Preferred Composition: The total amount of the element M and the element X is 0.01-10, preferably 1-4 wt.%. The amount of element M is 0.005-5, preferably 0.5-2 wt.%. The amount of the element X is 0.005-5, preferably 0.5-2 wt.%.

Preferred Property: The pH of the acidic coating solution is 0.8-1.3. The molar mixing ratio of the first compound to the second compound is 0.5-2:1-1.2.

Preferred Property: The surface-treatment layer has a thickness of

0.01-2microns. The positive active material has a tapping density of 1-3 g/cc, a pH of 8-13, and a pH of 10-11.5.

Preferred Condition: The heat-treating step is performed at 450-900degreesC for 1-20 hours.

ABEX DEFINITIONS - Preferred Definition: - M=Na, K, Mg, Ca, Sr, Ni, Co, Si, Ti, B, Al, Sn, Mn, Cr, Fe, V, and/or Zr; - X=P, S, and/or W.

EXAMPLE - A solution was prepared by adding 30 g aluminum nitrate nonahydrate, and 10.8 g ammonium phosphate (mole ratio of 1:1) to 400 ml water to prepare an acidic coating solution with a pH of 2.1. To the coating solution was added 100 g lithium nickel cobalt manganate with a diameter of 10 microns prepared by co-precipitation. The coating solution was dried at 130degreesC for 10 hours. The dried material was pulverized and heat-treated at 800degreesC for 7 hours to prepare a positive active material including a surface-treatment layer with a solid-solution compound including aluminum and phosphorus, and an aluminum phosphate compound. The positive active material and a carbon conductive agent were added to a binder solution of a 6 wt.% polyvinylidene fluoride binder in an N-methyl pyrrolidone solvent, at a weight ratio of 96:2:2, and were mixed, thus obtaining a positive active material slurry. The positive active material slurry was coated on an aluminum foil current collector. A graphite negative active material was added to a binder solution of 8 wt.% polyvinylidene fluoride binder in a N-methylpyrrolidone solvent at a weight ratio of 94:6 and mixed to prepare a negative active material slurry. The slurry was coated on a copper foil current collector. The coated current collector was pressed to obtain a positive active mass of 3.5 g/cm and a negative active mass of 1.6 g/cm<sup>3</sup>. - Using the pressed current collector, a rechargeable lithium battery with a capacity of 700 mAh was fabricated, and was dried for 12 hours. For an electrolyte, 1.15M lithium phosphorus hexafluoride in a mixed solvent of ethylene carbonate, ethyl methyl carbonate and diethyl carbonate (3:6:1 vol. %) was used.

FS CPI; EPI  
MC CPI: L03-E01B5B  
EPI: X16-E01C1

L47 ANSWER 4 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

AN 2004-718622 [70] WPIX

DNC C2004-253149 [70]

DNN N2004-569724 [70]

TI Anode active material for use in non-aqueous electrolyte secondary battery, comprises particles containing **first compound oxide of lithium and nickel**, and coating layers containing **second compound oxide of lithium and titanium**

DC L03; X16

IN HOSOYA Y; YAMAMOTO Y

PA (SONY-C) SONY CORP

CYC 4

PI US 20040201948 A1 20041014 (200470)\* EN 13[3]

JP 2004319105 A 20041111 (200474) JA 17 H01M0004-58

KR 2004089545 A 20041021 (200514) KO H01M0004-48

CN 1571194 A 20050126 (200530) ZH H01M0004-48

ADT US 20040201948 A1 US 2004-821323 20040409; JP 2004319105 A JP

2003-107509 20030411; KR 2004089545 A KR 2004-24611 20040409; CN

1571194 A CN 2004-10071489 20040412

PRAI JP 2003-107509 20030411

IC ICM H01M0004-48; H01M0004-58

ICS H01M0010-40; H01M0004-02

IPCR H01G0004-008 [I,A]; H01G0004-008 [I,C]; H01M0010-36 [I,C];

H01M0010-40 [I,A]; H01M0004-02 [I,A]; H01M0004-02 [I,C]; H01M0004-48

[I,A]; H01M0004-48 [I,C]; H01M0004-58 [I,A]; H01M0004-58 [I,C]

AB US 20040201948 A1 UPAB: 20060122

NOVELTY - An anode active material comprises particles having a

layered structure. The particles comprise a **first compound oxide of lithium and nickel**, and coating layers formed on the surfaces of the particles. The coating layers comprise a **second compound oxide of lithium and titanium**.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a non-aqueous electrolyte secondary battery comprising the above anode active material and a **cathode** active material.

USE - For use in an electrolyte secondary battery.

ADVANTAGE - The anode material provides a non-electrolyte secondary battery having both improved conductivity of lithium ions and high-temperature property.

DESCRIPTION OF DRAWINGS - The figure is a longitudinal sectional view of a non-aqueous electrolyte secondary battery.

Battery can (1)

Anode (2)

**Cathode** (3)

Separators (4)

Insulating plates (5, 6)

Battery lid (7)

Safety valve (8)

Positive temperature coefficient element (9)

Sealing gasket (10)

TECH INORGANIC CHEMISTRY - Preferred Composition: The **weight ratio of first compound oxide**

to **second compound oxide** is 96:4 -

65:35. Preferred Components: The **second compound oxide** has a spinel structure in the cubic system. Preferred Properties: The positive-electrode active material has a mean particle **diameter** of 5-20 **microns**.

ORGANIC CHEMISTRY - Preferred Composition: The **weight ratio of first compound oxide**

to **second compound oxide** is 96:4 -

65:35. Preferred Components: The **second compound oxide** has a spinel structure in the cubic system. Preferred Properties: The positive-electrode active material has a mean particle **diameter** of 5-20 **microns**.

FS CPI; EPI

MC CPI: L03-E01B8A

EPI: X16-B01F1; X16-E01C1

L47 ANSWER 5 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

AN 2000-441848 [38] WPIX

DNC C2000-134126 [38]

DNN N2000-329789 [38]

TI Lithium manganese oxide compounds for use in rechargeable lithium and **lithium-ion** secondary batteries comprises **titanium** or zirconium

DC L03; X16

IN GAO Y; YAKOVLEVA M

PA (FMCC-C) FMC CORP

CYC 90

PI WO 2000030977 A1 20000602 (200038)\* EN 16[0] C01G0001-00

AU 2000017392 A 20000613 (200043) EN

EP 1135334 A1 20010926 (200157) EN

TW 438721 A 20010607 (200175) ZH

US 6361756 B1 20020326 (200226) EN C01G0045-12

CN 1330614 A 20020109 (200229) ZH

EP 1135334 B1 20021009 (200274) EN

JP 2002530260 W 20020917 (200276) JA 16 C01G0045-00

DE 69903469 E 20021114 (200282) DE

CN 1170773 C 20041013 (200615) ZH

ADT WO 2000030977 A1 WO 1999-US27511 19991119; US 6361756 B1 Provisional  
US 1998-109415P 19981120; CN 1330614 A CN 1999-814643 19991119; DE  
69903469 E DE 1999-603469 19991119; EP 1135334 A1 EP 1999-960517



19991119; EP 1135334 B1 EP 1999-960517 19991119; DE 69903469 E EP 1999-960517 19991119; TW 438721 A TW 1999-120217 19991119; US 6361756 B1 US 1999-442302 19991119; EP 1135334 A1 WO 1999-US27511 19991119; EP 1135334 B1 WO 1999-US27511 19991119; JP 2002530260 W WO 1999-US27511 19991119; DE 69903469 E WO 1999-US27511 19991119; AU 2000017392 A AU 2000-17392 19991119; JP 2002530260 W JP 2000-583813 19991119; CN 1170773 C CN 1999-814643 19991119

FDT DE 69903469 E Based on EP 1135334 A; AU 2000017392 A Based on WO 2000030977 A; EP 1135334 A1 Based on WO 2000030977 A; EP 1135334 B1 Based on WO 2000030977 A; JP 2002530260 W Based on WO 2000030977 A; DE 69903469 E Based on WO 2000030977 A

PRAI US 1998-109415P 19981120  
US 1999-442302 19991119

IC ICM C01G0001-00; C01G0045-00; C01G0045-12  
ICS C01G0023-00; C01G0037-14; C01G0049-00; H01M0010-40; H01M0004-02; H01M0004-48; H01M0004-50; H01M0004-58

AB WO 2000030977 A1 UPAB: 20050411  
NOVELTY - Lithium manganese oxide compounds are of formula (I),  $\text{LiMn}_{1-x}(\text{A})\text{xO}_2$ .  
x = greater than 0 and less than 0.5;  
(A) = combination of two or more dopants  
The average oxidation state N of the dopant combination (A) is +2.8 - +3.2.  
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for a) lithium or lithium-ion secondary battery including the compound (I) as the positive electrode material; and b) preparing the compound (I) comprising mixing together source compounds containing Li, Mn and (A) in amounts corresponding to compound (I), and firing the mixture of source compounds at greater than 700 degreesC (preferably 800-1000 degreesC) to produce the compound.  
USE - For use in rechargeable lithium and lithium-ion secondary batteries for portable electronics, e.g. cellular camcorders and laptop computers, and in large power applications, e.g. electric vehicles and hybrid electric vehicles.  
ADVANTAGE - The reversible capacity of the invention is maximized.

TECH INORGANIC CHEMISTRY - Preferred Properties: The average oxidation state, N, is +3.0.

ABEX DEFINITIONS - Preferred Definitions: (i) - x = greater than 0 and at most 0.4; - (A) = Ti or Zr; - (ii) - x = a; - (A)x =  $\text{Al}_a/2\text{A}_2\text{a}/2$ ; - A1 = Ti and/or Zr (preferably Ti); - A2 = Mg, Ca, Sr, Zn, and/or Ba (preferably Mg); - (iii) - x = b; - (A)x =  $\text{Ni}_c\text{A}_d\text{A}_e\text{A}_f/2$ ; - A0 = Cr and/or Co (preferably Cr); - b = c+d+e+f or at least 0.1 and less than 0.5 (preferably 0.1-0.4); - c = 0.1-0.3; - d = at least 0 and less than 0.4; - e, f = 0-0.2

FS CPI; EPI  
MC CPI: L03-E01B5  
EPI: X16-B01F1; X16-E01C1; X16-E01G

L47 ANSWER 6 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
AN 1999-504230 [42] WPIX  
DNC C1999-147761 [42]  
DNN N1999-377041 [42]  
TI Positive electrode active material for lithium ion secondary battery - comprises complex oxide containing nickel, cobalt and at least one of manganese, aluminium and titanium  
DC L03; X16  
IN EJIMA K; HIRAKA Y; NISHINA M; OGI K; OKABE K; YAMANAKA Y  
PA (DOWA-C) DOWA MINING CO LTD  
CYC 1  
PI JP 11219706 A 19990810 (199942)\* JA 10[5] H01M0004-58  
JP 3355126 B2 20021209 (200301) JA 10  
ADT JP 11219706 A JP 1998-33679 19980130; JP 3355126 B2 JP 1998-33679 19980130  
FDT JP 3355126 B2 Previous Publ JP 11219706 A

PRAI JP 1998-33679 19980130

IC ICM H01M0004-58

ICS C01G0053-00; H01M0010-40; H01M0004-02

AB JP 11219706 A UPAB: 20050522

Primary particles of  $\text{LiNi}_{1-x-y}\text{Co}_x\text{E}_y\text{O}_2$  (E = at least one of Mn, Al, Ti;  $x = 0.10 - 0.20$ ;  $y = 0.02 - 0.10$ ) are connected, using an inorganic oxide-containing inorganic compound to

form secondary particles. A positive electrode active material contains the secondary particles. The positive electrode active material has differential thermal loss when temperature is elevated to 750 °C in inert gas atmos. of 0.5 weight% or less.

Also claimed is that production comprises: (a) primary firing processing - firing a mixture of each cpd., Li, Ni, Co, E at 500-800 °C; (b) dispersion granulation processing - breaking and dispersing the resulting fired product obtained in (a) in water to obtain a mean particle diameter of 1 micron or less; forming a slurry; spraying and drying the slurry to obtain spheroidal granulated powder; (c) secondary firing processing - firing the spheroidal granulated powder at temperature higher than the primary firing temperature by 30 °C to 900 °C.

USE - Used in lithium ion secondary battery (claimed).

ADVANTAGE - The positive electrode active material has improved reactivity and thermal stability with respect to the electrolyte, improved safety, and high capacity.

ABDT JP11219706

Primary particles of  $\text{LiNi}_{1-x-y}\text{Co}_x\text{E}_y\text{O}_2$  (E = at least one of Mn, Al, Ti;  $x = 0.10 - 0.20$ ;  $y = 0.02 - 0.10$ ) are connected, using an inorganic oxide-containing inorganic compound to

form secondary particles. A positive electrode active material contains the secondary particles. The positive electrode active material has differential thermal loss when temperature is elevated to 750 °C in inert gas atmos. of 0.5 weight% or less.

Also claimed is that production comprises:

(a) primary firing processing - firing a mixture of each cpd., Li, Ni, Co, E at 500-800 °C; (b) dispersion granulation processing - breaking and dispersing the resulting fired product obtained in (a) in water to obtain a mean particle diameter of 1 micron or less; forming a slurry; spraying and drying the slurry to obtain spheroidal granulated powder; (c) secondary firing processing - firing the spheroidal granulated powder at temperature higher than the primary firing temperature by 30 °C to 900 °C.

USE

Used in lithium ion secondary battery (claimed).

ADVANTAGE

The positive electrode active material has improved reactivity and thermal stability with respect to the electrolyte, improved safety, and high capacity. (PW)

FS CPI; EPI

MC CPI: L03-E01B5

EPI: X16-B01F1; X16-E01C1; X16-E01G

L47 ANSWER 7 OF 14 WPIX COPYRIGHT 2006

THE THOMSON CORP on STN

AN 1999-064731 [06] WPIX

DNC C1999-019513 [06]

DNN N1999-048260 [06]

TI Lithium cpd. oxide, its preparation, for lithium ion secondary batteries - comprises lithium-nickel-cobalt-oxide.

DC E34; L03; X16

IN KIMURA S; YAMAZAKI N

PA (NIPC-C) NIPPON CHEM IND CO LTD

CYC 1

PI JP 10310432 A 19981124 (199906)\* JA 5[0]

C01G0053-00

ADT JP 10310432 A JP 1997-130269 19970502

PRAI JP 1997-130269 19970502

IC ICM C01G0053-00

ICS H01M0004-58

AB JP 10310432 A UPAB: 20050520

Lithium cpd. oxide of formula (1) is characterised in that the water content of the lithium cpd. oxide is up to 0.1 weight% and/or the water content after it is left at a temperature of 30 °C and relative humidity of 60% for 12 hours is up to 0.6 weight%.

$\text{Li}_x\text{Ni}_y\text{Co}_z\text{O}_2$  (1)

x is greater than 0 and less than 1.1; y is greater than or equal to 0 and less than or equal to 0.6.

Also claimed is preparation of a lithium cpd. oxide by mixing crystal grains of a nickel salt or nickel-cobalt salt and a lithium salt and firing the mixture, which is characterised in that air with absolute humidity of up to 20 g/kg is blown into the furnace while the mixture is fired.

Also claimed is a positive electrode active substance for lithium ion secondary batteries, which mainly contains the above-claimed lithium cpd. oxide.

ADVANTAGE - Lithium ion secondary batteries with high energy densities and stable performance can be obtained from the lithium cpd. oxide invented.

ABDT JP10310432

Lithium cpd. oxide of formula (1) is characterised in that the water content of the lithium cpd. oxide is up to 0.1 weight% and/or the water content after it is left at a temperature of 30 °C and relative humidity of 60% for 12 hours is up to 0.6 weight%.

$\text{Li}_x\text{Ni}_y\text{Co}_z\text{O}_2$  (1)

x is greater than 0 and less than 1.1; y is greater than or equal to 0 and less than or equal to 0.6.

Also claimed is preparation of a lithium cpd. oxide by mixing crystal grains of a nickel salt or nickel-cobalt salt and a lithium salt and firing the mixture, which is characterised in that air with absolute humidity of up to 20 g/kg is blown into the furnace while the mixture is fired.

Also claimed is a positive electrode active substance for lithium ion secondary batteries, which mainly contains the above-claimed lithium cpd. oxide.

ADVANTAGE

Lithium ion secondary batteries with high energy densities and stable performance can be obtained from the lithium cpd. oxide invented.

FS CPI; EPI

MC CPI: E35-V; E35-W; L03-E01B5

EPI: X16-B01F1; X16-E01C1; X16-E01G

L47 ANSWER 8 OF 14 WPIX COPYRIGHT 2006

THE THOMSON CORP on STN

AN 1998-296738 [26] WPIX

DNC C1998-092408 [26]

DNN N1998-232170 [26]

TI Manufacture of modified lithium nickel oxide compounds - for use as an active cathode material in a secondary lithium intercalation cell.

DC L03; X16

IN EBNER W B; FOUCHARD D T; MEGAHED E; XIE L

PA (RAYV-C) RAYOVAC CORP

CYC 1

PI US 5750288 A 19980512 (199826)\* EN 22[9]

H01M0004-02

ADT US 5750288 A US 1995-538252 19951003

PRAI US 1995-538252 19951003

IC ICM H01M0004-02

AB US 5750288 A UPAB: 20060114

(I) Composition represented by  $\text{Li}_x\text{R}_y\text{Ni}_z\text{O}_2$ , where R = at least one non-transition metal from Al, Ga, Sn, or Zn, x is initially 0.95 - 1.05, y is 0.02 - 0.3 and z ~ 2. The composition has a crystalline structure corresponding to an 6 - NaCrO<sub>2</sub> structure. Also claimed

(II) is the composition as (I) with R having two components, the first as (I) and the second comprising at least one of Sc and a Period V transition metal having an atomic number 39 - 42, the first component 5 - 95 wt% of R and the second 95 - 5 wt%. Also claimed (III) is the composition as (II) where R is the second component only. Also claimed (IV) is an electrode for an electrochemical comprising the composition as (I) (II) or (III). Also claimed (V) is an electrochemical cell including the electrodes as (IV).

USE - Lithium intercalation secondary batteries.

ADVANTAGE - Increased charge capacity of 5 - 31% over prior

art.

ABDT US5750288

A composition of matter represented by:

$\text{Li}_x\text{R}_y\text{Ni}_z\text{-yO}_z$

R = at least one non-transition metal from Al, Ga, Sn, or Zn;

x = initially 0.95 - 1.05;

y = 0.02 - 0.3; and

z = ~2.

The composition has a crystalline structure corresponding to an 6 - NaCrO<sub>2</sub> structure.

Also claimed is the composition as above with R having two components, the first as above and the second comprising at least one of Sc and a Period V transition metal having an atomic number 39 - 42, the first component 5 - 95 wt% of R and the second 95 - 5 wt%. Further claimed is the composition where R is the second component only.

Even further claimed is an electrode for an electrochemical comprising the composition as in any of the above embodiments.

USE

Lithium intercalation secondary batteries.

ADVANTAGE

Increased charge capacity of 5 - 31% over prior art.

EXAMPLE

Stoichiometric amounts of LiOH, Ni(OH)<sub>2</sub> and R(OH)<sub>x</sub> were mixed to give an Li / (Ni+R) ratio of 1 : 1.1 and then ball milled for 30 min. The mixture was then heated in nickel boats in a humid O<sub>2</sub> atmosphere at a first temperature of 650 °C for 10 hr. then cooled to 400 °C and removed from the furnace and ball milled for 30 min. The powder was then re-heated at 650 °C for 3.5 - 5 hr. The resulting powder was then milled for 30 min. and screened < 150 μm. When used as a cathode in a cell the cell showed 5 - 31 % increase in charge capacity depending on current density.

PREFERRED METHOD

The composition has layers of the 6 - NaCrO<sub>2</sub> structure when x < 0.5 and preferably ≤ 0.4. y is 0.05-0.15 and preferably 0.1. The composition particles are ≤ 150 μm diameter. In (II) the first component is 30 - 70 wt% with the remainder the second component.

FS CPI; EPI

MC CPI: L03-E01B4; L03-E01B5; L03-E03; L03-E04A

EPI: X16-B01F1; X16-E01C1; X16-E01G

L47 ANSWER 9 OF 14 WPIX COPYRIGHT 2006

THE THOMSON CORP on STN

AN 1997-556618 [51] WPIX

DNC C1997-177760 [51]

DNN N1997-463906 [51]

TI Non-aqueous electrolytic secondary battery - comprises compound oxide of lithium, nickel and cobalt, for discharging and absorbing lithium

DC L03; X16

IN ASAOKA S; KOBAYASHI S; WATANABE S

PA (MATU-C) MATSUSHITA DENKI SANGYO KK

CYC 1

PI JP 09270257 A 19971014 (199751)\* JA 6[4] H01M0004-58  
 JP 3420425 B2 20030623 (200341) JA 6 H01M0004-58  
 ADT JP 09270257 A JP 1996-79089 19960401; JP 3420425 B2 JP 1996-79089  
 19960401  
 FDT JP 3420425 B2 Previous Publ JP 9270257 A  
 PRAI JP 1996-79089 19960401  
 IC ICM H01M0004-58  
 ICS H01M0010-40; H01M0004-02  
 AB JP 09270257 A UPAB: 20050827  
 The battery has a lithium-containing compound oxide of 100.5-102.0  
 Å<sup>3</sup> in unit cell volume as its **cathode** active material  
 represented by a formula,  $\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_2$  (where  $x=0-1.2$  and  $y=0-0.5$ )  
 and its anode absorbing and discharging lithium.  
 ADVANTAGE - Discharge capacity of the battery is increased.  
 ABDT JP09270257  
 The battery has a lithium-containing compound oxide of 100.5-102.0  
 Å<sup>3</sup> in unit cell volume as its **cathode** active material  
 represented by a formula,  $\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_2$  (where  $x=0-1.2$  and  $y=0-0.5$ )  
 and its anode absorbing and discharging lithium.  
 ADVANTAGE  
 Discharge capacity of the battery is increased.  
 FS CPI; EPI  
 MC CPI: L03-E01B5  
 EPI: X16-B01F1; X16-E01C1

L47 ANSWER 10 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
 AN 1997-199373 [18] WPIX  
 DNC C1997-063796 [18]  
 DNN N1997-164860 [18]  
 TI Lithium secondary cell - comprises **lithium** (cpd.)  
**cathode** and **lithium-nickel** oxide and  
 potassium manganate solid solution  
 DC L03; X16  
 IN KAWAKAMI A; MATSUMOTO K; TOSHIRO H  
 PA (HITM-C) HITACHI MAXELL KK  
 CYC 1  
 PI JP 09055211 A 19970225 (199718)\* JA 7[1] H01M0004-58  
 JP 3539518 B2 20040707 (200444) JA 9  
 ADT JP 09055211 A JP 1995-227287 19950811; JP 3539518 B2 JP 1995-227287  
 19950811  
 FDT JP 3539518 B2 Previous Publ JP 09055211 A  
 PRAI JP 1995-227287 19950811  
 IC ICM H01M0004-58  
 ICS H01M0010-40; H01M0004-02  
 AB JP 09055211 A UPAB: 20050520  
 Cell using a **cathode** active material made of Li or cpd.  
 containing Li, and an anode active material made of solid solution of  
 $\text{LiNiO}_2$  and  $\text{K}_2\text{MnO}_3$ .  
 ADVANTAGE - The cell has no lowering of load characteristics  
 at handling in air, and has higher capacity without using Co.  
 ABDT JP09055211  
 Cell using a **cathode** active material made of Li or cpd.  
 containing Li, and an anode active material made of solid solution of  
 $\text{LiNiO}_2$  and  $\text{K}_2\text{MnO}_3$ .  
 ADVANTAGE  
 The cell has no lowering of load characteristics at handling in air,  
 and has higher capacity without using Co.  
 FS CPI; EPI  
 MC CPI: L03-E03  
 EPI: X16-B01F1; X16-E01C

L47 ANSWER 11 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
 AN 1996-210028 [21] WPIX  
 DNN N1996-175705 [21]  
 TI Thin film solar cell - has sequentially laminated transparent  
**electrode** layer, thin film semiconductor layer and back

electrode on insulating transparent substrate

DC L03; U12; X15

IN HAYASHI K; ISHIKAWA A; KONDO M; KURATA S; YAMAGISHI H

PA (KANF-C) KANEBUCHI KAGAKU KOGYO KK; (KANF-C) KANEGAFUCHI CHEM IND CO LTD; (KANF-C) KANEGAFUCHI KAGAKU KOGYO KK

CYC 20

PI WO 9611500 A1 19960418 (199621)\* JA 21[5] H01L0031-042  
 JP 08107225 A 19960423 (199626) JA 6 H01L0031-04  
 JP 08107228 A 19960423 (199626) JA 7[3] H01L0031-04  
 EP 734075 A1 19960925 (199643) EN 14[5] H01L0031-042  
 JP 09087860 A 19970331 (199723) JA 5 C23C0028-00  
 TW 304309 A 19970501 (199730) ZH H01L0031-042  
 CN 1136858 A 19961127 (199805) ZH H01L0031-042  
 US 5828117 A 19981027 (199850) EN H01L0031-075  
 JP 3346119 B2 20021118 (200279) JA 5 C23C0028-00  
 CN 1096119 C 20021211 (200528) ZH

ADT WO 9611500 A1 WO 1995-JP2030 19951004; JP 08107225 A JP 1994-242508 19941006; JP 08107228 A JP 1994-242509 19941006; JP 09087860 A JP 1995-244849 19950922; JP 3346119 B2 JP 1995-244849 19950922; CN 1136858 A CN 1995-191011 19951004; CN 1096119 C CN 1995-191011 19951004; EP 734075 A1 EP 1995-933612 19951004; EP 734075 A1 WO 1995-JP2030 19951004; US 5828117 A Cont of WO 1995-JP2030 19951004; TW 304309 A TW 1995-112557 19951124; US 5828117 A Cont of US 1996-647893 19960604; US 5828117 A US 1997-859687 19970521

FDT JP 3346119 B2 Previous Publ JP 09087860 A; EP 734075 A1 Based on WO 9511500 A

PRAI JP 1995-244849 19950922  
 JP 1994-242508 19941006  
 JP 1994-242509 19941006

IC ICM C23C0028-00; H01L0031-04; H01L0031-042; H01L0031-075  
 ICS C23C0014-06; C23C0014-16; H01L0029-40; H01L0031-105; H01L0031-117; H01L0049-02

ICA H01L0021-203

AB WO 1996011500 A1 UPAB: 20060110  
 The solar cell includes a structure with a sequentially laminated transparent **electrode** layer, thin film semiconductor layer and back **electrode** layer on an insulating transparent substrate. The back **electrode** layer comprises a transparent conductive metal compound layer (e.g. tin oxide) with a lower refractive index than the semiconductor which constitutes the thin film semiconductor layer. Cadmium sulphide is used for the transparent conductive metal compound layer.  
 A second thin film solar cell has a sequentially laminated transparent **electrode** layer, thin film semiconductor layer and back **electrode** layer on an insulating transparent substrate. The back **electrode** layer comprises a laminate of an intermediate thin layer containing silver, oxygen and constituent metal elements of a transparent conductive metal oxide and a silver thin film, and zinc is particularly suitable for the constituent metal element of the transparent conductive metal oxide.  
 ADVANTAGE - Has improved bonding strength and reflectivity of back **electrode** layer.

FS CPI; EPI

MC CPI: L03-E05B  
 EPI: U12-A02A4A; U12-B03B; X15-A02A

L47 ANSWER 12 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

AN 1995-249441 [33] WPIX

DNC C1995-114078 [32]

DNN N1995-193243 [32]

TI Positive **electrode** active material mfr. for non-aqueous electrolyte secondary battery - using compound oxide in which molar ratio of lithium to nickel exceeds one

DC L03; X16

IN ARITSUKA M; KURASAWA T; OMUKAI T; TANAKA T

PA (MITK-C) MITSUI TOATSU CHEM INC

CYC 1  
 PI JP 07153466 A 19950616 (199533)\* JA 6[3] H01M0004-58  
 ADT JP 07153466 A JP 1993-299476 19931130  
 PRAI JP 1993-299476 19931130  
 IC ICM H01M0004-58  
 ICS H01M0004-02  
 AB JP 07153466 A UPAB: 20050512  
 The manufacturing method forms a compound oxide whose general formula is  $\text{Li}_x\text{NiO}_2$  where  $x > 1.0$ . This compound oxide is used as positive electrode active material.  
 The molar ratio of lithium to nickel is greater than one. This compound oxide is finally baked at the temperature of 500-1000 deg centigrade in the presence of air.  
 USE/ADVANTAGE - In e.g. laptop, VTR, camera, portable telephone. Raises strength ratio and hence discharge capacity. Obtains superb cycle characteristics.  
 FS CPI; EPI  
 MC CPI: L03-E01B4; L03-E01B5  
 EPI: X16-B01F; X16-E01; X16-E08  
  
 L47 ANSWER 13 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
 AN 1995-219183 [29] WPIX  
 DNC C1995-101246 [29]  
 DNN N1995-171954 [29]  
 TI Thin film solar battery mfr. - involves interposing interface layer comprising metal oxide or silicon compound, between substrate and first and second electrode layers  
 DC L03; U12; X15  
 IN SATO K  
 PA (FJIE-C) FUJI ELECTRIC CO LTD  
 CYC 1  
 PI JP 07131039 A 19950519 (199529)\* JA 4[3] H01L0031-04  
 ADT JP 07131039 A JP 1993-273921 19931102  
 PRAI JP 1993-273921 19931102  
 IC ICM H01L0031-04  
 AB JP 07131039 A UPAB: 20050512  
 The manufacturing method incorporates a insulated substrate (1) which is broken into small pieces by means of through holes (21,22). A first electrode layer (3) and a third electrode layer (6) are formed on the whole surface of the substrate. A second transparent layer (5) is formed on the top surface of the substrate. The first and third layers are semiconductor layers. An interface layer consisting of metal oxide or silicon compound is inserted between the first and third electrode layers and the substrate. The first electrode layer and insulated substrate are connected at regular intervals through the through holes.  
 ADVANTAGE - Improves adhesion between substrate and electrode layers. Inhibits peeling of layers near through holes. Provides battery with good characteristics and sufficient yield.  
 FS CPI; EPI  
 MC CPI: L03-E05B; L04-C11C; L04-C12A; L04-C13A  
 EPI: U12-A02A3; U12-B03B; X15-A02A  
  
 L47 ANSWER 14 OF 14 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN  
 AN 1994-361140 [45] WPIX  
 DNC C1994-164631 [45]  
 DNN N1994-283021 [45]  
 TI Positive electrode for lithium secondary cell - uses compound oxide which contains either one of Cu, Zn, Nb, Mo or W as active material  
 DC L03; X16  
 IN HASEGAWA M; ITO S; MIFUJI Y; MURAI S; TOYOGUCHI Y  
 PA (MATU-C) MATSUSHITA DENKI SANGYO KK

CYC 1  
 PI JP 06283174 A 19941007 (199445)\* JA 6[0] H01M0004-58  
 JP 3229425 B2 20011119 (200176) JA 6  
 ADT JP 06283174 A JP 1993-95339 19930329; JP 3229425 B2 JP 1993-95339 19930329  
 FDT JP 3229425 B2 Previous Publ JP 06283174 A  
 PRAI JP 1993-95339 19930329  
 IC ICM H01M0004-58  
 ICS H01M0010-40; H01M0004-02  
 AB JP 06283174 A UPAB: 20060109  
 The positive electrode lithium secondary cell using non-aqueous electrolyte is characterised by the presence of a compound oxide. The compound oxide is expressed as  $\text{Li}(y)\text{Ni}(1-x)\text{M}(x)\text{O}_2$  where M is chosen from a group of metals such as copper, zinc, niobium, molybdenum and tungsten. At least one of the elements from this group is present in the compound oxide and is used up as active material. The value of x is fixed in the range  $0 \leq x \leq 1$ , while y content is  $0.9 \leq y \leq 1.3$  in the compound oxide.  
 ADVANTAGE - Improves capacity and charge discharge nature of secondary cell.  
 FS CPI; EPI  
 MC CPI: L03-E01B5; L03-E01C  
 EPI: X16-B01F1; X16-E01C

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FILE COVERS 1907 - 29 Nov 2006 VOL 145 ISS 23  
 FILE LAST UPDATED: 27 Nov 2006 (20061127/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d l35 que stat  
 L4 6570 SEA FILE=REGISTRY ABB=ON PLU=ON (LI (L) NI (L) O)/ELS  
 L5 5467 SEA FILE=REGISTRY ABB=ON PLU=ON (LI (L) TI (L) O)/ELS  
 L6 1 SEA FILE=REGISTRY ABB=ON PLU=ON 116327-68-5/RN  
 L7 1 SEA FILE=REGISTRY ABB=ON PLU=ON 118819-40-2/RN  
 L8 1 SEA FILE=REGISTRY ABB=ON PLU=ON 193215-53-1/RN  
 L9 3 SEA FILE=REGISTRY ABB=ON PLU=ON L6 OR L7 OR L8  
 L10 1 SEA FILE=REGISTRY ABB=ON PLU=ON 12031-82-2/RN  
 L11 1 SEA FILE=REGISTRY ABB=ON PLU=ON 12031-95-7/RN  
 L12 1 SEA FILE=REGISTRY ABB=ON PLU=ON 12163-02-9/RN  
 L13 1 SEA FILE=REGISTRY ABB=ON PLU=ON 219737-79-8/RN  
 L14 4 SEA FILE=REGISTRY ABB=ON PLU=ON L10 OR L11 OR L12 OR L13  
 L15 650 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 AND L5  
 L16 2754 SEA FILE=HCAPLUS ABB=ON PLU=ON L9 OR COBALT LITHIUM



NICKEL OXIDE# OR COBALT LITHIUM MANGANESE OXIDE# OR  
 COBALT LITHIUM MANGANESE NICKEL OXIDE#

L17 1097 SEA FILE=HCAPLUS ABB=ON PLU=ON L14 OR LITHIUM TITANIUM  
 OXIDE# OR LI2TIO3 OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM  
 MANGANESE TITANIUM OXIDE#

L18 58 SEA FILE=HCAPLUS ABB=ON PLU=ON L16 AND L17

L19 655 SEA FILE=HCAPLUS ABB=ON PLU=ON L15 OR L18

L21 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A) (COMP  
 OUND? OR COMPD? OR COMPN?) (2A) OXIDE#

L22 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
 COMPD? OR COMPN?) (2A) OXIDE#

L23 11 SEA FILE=HCAPLUS ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
 (NICKEL OR NI) (L) (L21 OR L22)

L24 4 SEA FILE=HCAPLUS ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
 (TITANIUM OR TI) (L) (L21 OR L22)

L25 70956 SEA FILE=HCAPLUS ABB=ON PLU=ON (PROPORTION? OR RATIO#)  
 (3A) (WT# OR WEIGHT#)

L26 125748 SEA FILE=HCAPLUS ABB=ON PLU=ON (DIAMETER# OR DIAM#)  
 (S) (M OR MICROMETER# OR MICRO (2A) METER#)

L27 1 SEA FILE=HCAPLUS ABB=ON PLU=ON L19 AND L21 AND L22

L28 2 SEA FILE=HCAPLUS ABB=ON PLU=ON L19 AND (L21 OR L22)

L29 3 SEA FILE=HCAPLUS ABB=ON PLU=ON L19 AND L25

L30 17 SEA FILE=HCAPLUS ABB=ON PLU=ON L19 AND L26

L31 QUE ABB=ON PLU=ON (ELECTRODE# OR CATHODE#)

L32 31 SEA FILE=HCAPLUS ABB=ON PLU=ON L23 OR L24 OR L27 OR  
 L28 OR L29 OR L30

L33 28 SEA FILE=HCAPLUS ABB=ON PLU=ON L32 AND L31

L34 27 SEA FILE=HCAPLUS ABB=ON PLU=ON L33 AND ELECTROCHEM#/SC,  
 SX

L35 23 SEA FILE=HCAPLUS ABB=ON PLU=ON L34 AND (1840-2003)/PRY,  
 PY,AY

=> file japio

FILE 'JAPIO' ENTERED AT 15:08:16 ON 29 NOV 2006  
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=> d 158 que stat

L48 QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR COBA  
 LT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM MANGANESE N  
 ICKEL OXIDE#

L49 QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3  
 OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM O  
 XIDE#

L50 0 SEA FILE=JAPIO ABB=ON PLU=ON L48 AND L49

L51 QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A) (COMP  
 OUND? OR COMPD? OR COMPN?) (2A) OXIDE#

L52 QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR  
 COMPD? OR COMPN?) (2A) OXIDE#

L53 6 SEA FILE=JAPIO ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
 (NICKEL OR NI) (L) (L51 OR L52)

L54 1 SEA FILE=JAPIO ABB=ON PLU=ON (LITHIUM OR LI) (4A)  
 (TITANIUM OR TI) (L) (L51 OR L52)

L55 0 SEA FILE=JAPIO ABB=ON PLU=ON L51 AND L52 AND (DIAMETER#  
 OR DIAM#) (S) (M OR MICROMETER OR MICRO (2A) METER# OR  
 MICRON#)

L56 0 SEA FILE=JAPIO ABB=ON PLU=ON L51 AND L52 AND (PROPORTIO  
 N? OR RATIO#) (3A) (WT# OR WEIGHT#)

L58 6 SEA FILE=JAPIO ABB=ON PLU=ON (L50 OR L53 OR L54 OR L55  
 OR L56) AND (ELECTRODE# OR CATHODE#)

=> file jicst

FILE 'JICST-EPLUS' ENTERED AT 15:08:26 ON 29 NOV 2006

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=> d 166 que stat

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L59      QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR COBAL
        LT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM MANGANESE N
        ICKEL OXIDE#
L60      QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3
        OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM O
        XIDE#
L61      0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON L59 AND L60
L62      QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A) (COMP
        OUND? OR COMPD? OR COMPN?) (2A) OXIDE#
L63      QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR
        COMPD? OR COMPN?) (2A) OXIDE#
L64      0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (LITHIUM OR LI)
        (4A) (NICKEL OR NI) (L) (L62 OR L63)
L65      0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON (LITHIUM OR LI)
        (4A) (TITANIUM OR TI) (L) (L62 OR L63)
L66      0 SEA FILE=JICST-EPLUS ABB=ON PLU=ON L61 OR L64 OR L65
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=> file compendex

FILE 'COMPENDEX' ENTERED AT 15:08:41 ON 29 NOV 2006  
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=> d 175 que stat

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L67      QUE ABB=ON PLU=ON COBALT LITHIUM NICKEL OXIDE# OR COBAL
        LT LITHIUM MANGANESE OXIDE# OR COBALT LITHIUM MANGANESE N
        ICKEL OXIDE#
L68      QUE ABB=ON PLU=ON LITHIUM TITANIUM OXIDE# OR LI2TIO3
        OR LI4TI5O12 OR LI2TI3O7 OR LITHIUM MANGANESE TITANIUM O
        XIDE#
L69      0 SEA FILE=COMPENDEX ABB=ON PLU=ON L67 AND L68
L70      QUE ABB=ON PLU=ON (FIRST OR PRIMARY OR 1ST) (3A) (COMP
        OUND? OR COMPD? OR COMPN?) (2A) OXIDE#
L71      QUE ABB=ON PLU=ON (SECOND? OR 2ND) (3A) (COMPOUND? OR
        COMPD? OR COMPN?) (2A) OXIDE#
L72      0 SEA FILE=COMPENDEX ABB=ON PLU=ON (LITHIUM OR LI) (4A)
        (TITANIUM OR TI) (L) (L70 OR L71)
L73      0 SEA FILE=COMPENDEX ABB=ON PLU=ON (LITHIUM OR LI) (4A)
        (NICKEL OR NI) (L) (L71 OR L72)
L74      0 SEA FILE=COMPENDEX ABB=ON PLU=ON L70 AND L71
L75      0 SEA FILE=COMPENDEX ABB=ON PLU=ON L69 OR L72 OR L73 OR
        L74
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=> dup rem 135 158

PROCESSING COMPLETED FOR L35  
 PROCESSING COMPLETED FOR L58  
 L76 29 DUP REM L35 L58 (0 DUPLICATES REMOVED)

=&gt; d all hitstr 176 1-29

L76 ANSWER 1 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 2005:140639 HCAPLUS  
 DN 142:222635  
 ED Entered STN: 18 Feb 2005  
 TI Cathodes for rechargeable batteries  
 IN Wang, Chuanfu; Jiang, Zhanfeng; Dong, Junqing  
 PA Peop. Rep. China  
 SO U.S. Pat. Appl. Publ., 9 pp., Cont.-in-part of U.S. Ser. No.  
 841,760.  
 CODEN: USXXCO  
 DT Patent  
 LA English  
 IC ICM H01M0004-52  
 ICS B05D0005-12  
 INCL 429231300; 429223000; 252182100; 427126600  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)

FAN.CNT 7

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2005037263	A1	20050217	US 2004-918580	200408 13
	CN 1581561	A	20050216	CN 2003-140196	200308 15
	CN 1581543	A	20050216	CN 2003-140216	200308 15
	US 2005053545	A1	20050310	US 2003-717236	200311 19
	US 2004121236	A1	20040624	US 2003-733018	200312 10
	US 2004191161	A1	20040930	US 2004-823931	200404 14
	US 2004223906	A1	20041111	US 2004-841760	200405 08
	US 2005130042	A1	20050616	US 2004-10041	200412 10
PRAI	CN 2003-140196	A	20030815	<--	
	CN 2003-140216	A	20030815	<--	
	US 2003-717236	A2	20031119	<--	
	US 2003-733018	A2	20031210	<--	
	US 2004-823931	A2	20040414		
	US 2004-841760	A2	20040508		
	CN 2002-151991	A	20021119	<--	
	CN 2002-156241	A	20021210	<--	
	CN 2003-114242	A	20030414	<--	
	CN 2003-126555	A	20030509	<--	

CN 2003-139607	A	20030623	<--
CN 2003-10112600	A	20031211	<--
US 2004-770630	A2	20040202	
US 2004-918580	A2	20040813	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2005037263	ICM	H01M0004-52
	ICS	B05D0005-12
	INCL	429231300; 429223000; 252182100; 427126600
	IPCI	H01M0004-52 [ICM]; B05D0005-12 [ICS]
	IPCR	B05D0005-12 [I,C*]; B05D0005-12 [I,A]; H01M0004-52 [I,C*]; H01M0004-52 [I,A]
	NCL	429/231.300; 252/182.100; 427/126.600; 429/223.000
CN 1581561	IPCI	H01M0010-40 [ICM,7]; H01M0010-38 [ICS,7]; H01M0010-36 [ICS,7,C*]; H01M0004-48 [ICS,7]; H01M0004-58 [ICS,7]; H01M0004-04 [ICS,7]
	IPCR	H01M0004-04 [I,C*]; H01M0004-04 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0010-36 [I,C*]; H01M0010-38 [I,A]; H01M0010-40 [I,A]
CN 1581543	IPCI	H01M0004-48 [ICM,7]; C01G0001-02 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	C01G0001-02 [I,C*]; C01G0001-02 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
US 2005053545	IPCI	C01D0001-02 [ICM,7]; C01D0001-00 [ICM,7,C*]
	IPCR	C01B0013-14 [I,C*]; C01B0013-14 [I,A]; C01B0031-00 [I,C*]; C01B0031-24 [I,A]; C01D0001-00 [I,C*]; C01D0001-02 [I,A]; C01D0015-00 [I,C*]; C01D0015-00 [I,A]; C01D0015-02 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]
	NCL	423/594.150
US 2004121236	IPCI	H01M0004-62 [ICM,7]
	IPCR	H01M0004-48 [I,A]; H01M0004-48 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*]; H01M0004-62 [I,A]; H01M0004-62 [I,C*]; H01M0004-66 [I,A]; H01M0004-66 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	NCL	429/232.000
US 2004191161	IPCI	H01M0004-58 [ICM]
	IPCR	H01M0004-58 [I,C*]; H01M0004-58 [I,A]
	NCL	423/594.200; 423/594.400
US 2004223906	IPCI	C01G0051-04 [ICM]; C01G0051-00 [ICM,C*]; G01G0053-04 [ICS]; H01M0004-52 [ICS]
	IPCR	C01G0051-00 [I,C*]; C01G0051-04 [I,A]; C01G0053-00 [I,C*]; C01G0053-04 [I,A]; H01M0004-52 [I,C*]; H01M0004-52 [I,A]
	NCL	423/594.400; 423/594.600; 429/223.000; 429/231.100; 429/231.300
US 2005130042	IPCI	H01M0004-52 [ICM,7]; H01M0004-50 [ICS,7]; C01G0045-12 [ICS,7]; C01G0045-00 [ICS,7,C*]; C01G0051-04 [ICS,7]; C01G0051-00 [ICS,7,C*]; C01G0053-04 [ICS,7]; C01G0053-00 [ICS,7,C*]
	IPCR	C01G0045-00 [I,C*]; C01G0045-12 [I,A]; C01G0051-00 [I,C*]; C01G0051-04 [I,A]; C01G0053-00 [I,C*]; C01G0053-04 [I,A]; H01M0004-02 [N,C*]; H01M0004-02 [N,A]; H01M0004-36 [N,C*]; H01M0004-36 [N,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0004-50 [I,C*]; H01M0004-50 [I,A]; H01M0004-52 [I,C*]; H01M0004-52 [I,A]; H01M0004-62 [I,C*]; H01M0004-62 [I,A]

NCL 429/231.300; 252/182.100; 423/594.400;  
 423/594.600; 423/599.000; 429/223.000;  
 429/224.000  
 ECLA C01G045/00; C01G045/00D; C01G051/00; C01G053/00D;  
 H01M004/04F; H01M004/48B2; H01M004/50B2;  
 H01M004/52B2; H01M004/62

AB The present invention discloses active materials for the pos.  
**electrodes** of rechargeable batteries and the methods of  
 fabrication for the active materials as well as pos.  
**electrodes** thereof. The active material comprises of a  
 mixture of two components, A and B. A are compds. of lithium nickel  
 cobalt metal oxide while B are oxides of lithium cobalt. In a  
 preferred embodiment, a formula for the compds. of lithium nickel  
 metal oxide, A, is  $\text{Li}_a \text{Ni}_{1-b-c} \text{Co}_b \text{M}_c \text{O}_2$  where  
 $0.97 \leq a \leq 1.05$ ,  $0.01 \leq b \leq 0.30$ ,  
 $0 \leq c \leq 0.10$ , and M is one or more of the following:  
 manganese, aluminum, titanium, chromium, magnesium, calcium,  
 vanadium, iron, and zirconium. The **weight ratio** of  
 A:B is between 20:80 and 80:20. Rechargeable batteries with pos.  
**electrodes** fabricated with the fabrication methods of this  
 invention or with the active materials disclosed in this invention,  
 exhibit excellent overall and electrochem. properties with no  
 formation of halite magnetic domains. They have high discharge  
 capacities, high discharge energies, long cycle lives, and excellent  
 large discharge current characteristics.

ST **cathode** rechargeable battery

IT Battery **cathodes**

(**cathodes** for rechargeable batteries)

IT Secondary batteries

(lithium; **cathodes** for rechargeable batteries)

IT 52627-24-4, Cobalt lithium oxide 61179-08-6, Cobalt nickel

hydroxide 177997-13-6, Aluminum cobalt lithium nickel  
 oxide 180997-14-2, Cobalt lithium magnesium nickel oxide

182442-94-0, Cobalt lithium nickel vanadium oxide

182442-95-1, Cobalt lithium manganese nickel oxide

182442-96-2, Cobalt iron lithium nickel oxide

191025-46-4, Cobalt lithium nickel zirconium oxide

197235-81-7, Cobalt nickel hydroxide ( $\text{Co}_{0.19}\text{Ni}_{0.81}(\text{OH})_2$ )

210353-05-2, Calcium cobalt lithium nickel oxide

244304-20-9, Cobalt lithium nickel titanium oxide

244304-21-0, Chromium cobalt lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(**cathodes** for rechargeable batteries)

IT 177997-13-6, Aluminum cobalt lithium nickel oxide

180997-14-2, Cobalt lithium magnesium nickel oxide

182442-94-0, Cobalt lithium nickel vanadium oxide

182442-95-1, Cobalt lithium manganese nickel oxide

182442-96-2, Cobalt iron lithium nickel oxide

191025-46-4, Cobalt lithium nickel zirconium oxide

210353-05-2, Calcium cobalt lithium nickel oxide

244304-20-9, Cobalt lithium nickel titanium oxide

244304-21-0, Chromium cobalt lithium nickel oxide

RL: DEV (Device component use); USES (Uses)

(**cathodes** for rechargeable batteries)

RN 177997-13-6 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Al	x	7429-90-5

RN 180997-14-2 HCAPLUS  
 CN Cobalt lithium magnesium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2

RN 182442-94-0 HCAPLUS  
 CN Cobalt lithium nickel vanadium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
V	x	7440-62-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 182442-95-1 HCAPLUS  
 CN Cobalt lithium manganese nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 182442-96-2 HCAPLUS  
 CN Cobalt iron lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Fe	x	7439-89-6

RN 191025-46-4 HCAPLUS  
 CN Cobalt lithium nickel zirconium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Zr	x	7440-67-7
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 210353-05-2 HCAPLUS  
 CN Calcium cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====

O	x	17778-80-2
Ca	x	7440-70-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-20-9 HCAPLUS

CN Cobalt lithium nickel titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ti	x	7440-32-6
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-21-0 HCAPLUS

CN Chromium cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Cr	x	7440-47-3
Ni	x	7440-02-0
Li	x	7439-93-2

L76 ANSWER 2 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2005:492991 HCAPLUS

DN 143:10646

ED Entered STN: 10 Jun 2005

TI Secondary lithium battery and its manufacture

IN Fujii, Akihiro; Shiozaki, Ryuji; Nukuta, Toshiyuki

PA Yuasa Corporation, Japan

SO Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0010-40

ICS H01M0004-02; H01M0004-58; C01G0053-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 2005149867	A2	20050609	JP 2003-384554	20031114

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PRAI JP 2003-384554

20031114 &lt;--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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JP 2005149867	ICM	H01M0010-40
	ICS	H01M0004-02; H01M0004-58; C01G0053-00
	IPCI	H01M0010-40 [ICM,7]; H01M0010-36 [ICM,7,C*]; H01M0004-02 [ICS,7]; H01M0004-58 [ICS,7]; C01G0053-00 [ICS,7]
	IPCR	C01G0053-00 [N,A]; C01G0053-00 [N,C*]; H01M0004-02 [I,A]; H01M0004-02 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*];

H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 FTERM 4G048/AA04; 4G048/AB02; 4G048/AC06; 4G048/AD04;  
 4G048/AD06; 4G048/AE05; 5H029/AJ04; 5H029/AJ14;  
 5H029/AK03; 5H029/AL06; 5H029/AL07; 5H029/AM03;  
 5H029/AM04; 5H029/AM05; 5H029/AM07; 5H029/CJ16;  
 5H029/DJ17; 5H029/HJ02; 5H029/HJ18; 5H029/HJ19;  
 5H050/AA09; 5H050/AA19; 5H050/BA17; 5H050/CA08;  
 5H050/CA09; 5H050/CB07; 5H050/CB08; 5H050/FA19;  
 5H050/HA02; 5H050/HA18; 5H050/HA19; 5H050/HA20

AB The battery has a Li intercalating anode, a nonaq. electrolyte solution, and a Li intercalating cathode using a Li transition metal compound active mass having an  $\alpha$ -NaFeO<sub>2</sub> type layered structure; and is prepared by keeping the cathode during initial charging at a potential 100 mV higher than the end-of-charge potential in battery operation for  $\geq 50$  h. Preferably, the cathode active mass is  $\text{Li}_x\text{Ni}_a\text{Mn}_b\text{Co}_c\text{O}_z$ , where  $0 < x \leq 1.3$ ,  $a < 1.0$ ,  $b < 0.6$ ,  $c < 1$ ,  $(a+b+c) = 1$ , and  $1.7 \leq z \leq 2.3$ .

ST secondary lithium battery cathode manuf initial charge potential; lithium nickel manganese cobalt oxide cathode compn secondary battery

IT Battery cathodes  
 (compsn. and initial charge potential of lithium transition metal oxide cathodes for secondary lithium batteries)

IT 12190-79-3P, Cobalt lithium oxide (CoLiO<sub>2</sub>) 182442-95-1P, Cobalt lithium manganese nickel oxide  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (compsn. and initial charge potential of lithium transition metal oxide cathodes for secondary lithium batteries)

L76 ANSWER 3 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 2005:428717 HCAPLUS  
 DN 142:466511  
 ED Entered STN: 20 May 2005  
 TI Manufacturing of secondary battery group for automobile  
 IN Yamamura, Akira  
 PA Nissan Motor Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 17 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0002-34  
 ICS H01M0002-02; H01M0002-08; H01M0002-10; H01M0002-30;  
 H01M0004-02; H01M0004-58; H01M0010-04; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 72, 76

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005129344	A2	20050519	JP 2003-363224	20031023

PRAI JP 2003-363224

20031023 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2005129344	ICM	H01M0002-34
	ICS	H01M0002-02; H01M0002-08; H01M0002-10; H01M0002-30; H01M0004-02; H01M0004-58; H01M0010-04; H01M0010-40
	IPCI	H01M0002-34 [ICM,7]; H01M0002-20 [ICM,7,C*];



H01M0002-02 [ICS,7]; H01M0002-08 [ICS,7];  
H01M0002-10 [ICS,7]; H01M0002-30 [ICS,7];  
H01M0004-02 [ICS,7]; H01M0004-58 [ICS,7];  
H01M0010-04 [ICS,7]; H01M0010-40 [ICS,7];  
H01M0010-36 [ICS,7,C\*]  
IPCR H01M0002-02 [I,A]; H01M0002-02 [I,C\*];  
H01M0002-08 [I,A]; H01M0002-08 [I,C\*];  
H01M0002-10 [I,A]; H01M0002-10 [I,C\*];  
H01M0002-20 [I,C\*]; H01M0002-30 [I,A];  
H01M0002-30 [I,C\*]; H01M0002-34 [I,A];  
H01M0004-02 [I,A]; H01M0004-02 [I,C\*];  
H01M0004-58 [I,A]; H01M0004-58 [I,C\*];  
H01M0010-04 [I,A]; H01M0010-04 [I,C\*];  
H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
FTERM 5H011/AA03; 5H011/BB03; 5H011/CC10; 5H011/DD13;  
5H011/FF02; 5H011/GG09; 5H011/JJ25; 5H011/JJ27;  
5H022/AA19; 5H022/CC02; 5H022/EE01; 5H022/EE03;  
5H022/EE04; 5H022/KK03; 5H028/AA07; 5H028/BB05;  
5H028/CC02; 5H028/CC08; 5H029/AJ12; 5H029/AK03;  
5H029/AL06; 5H029/AM03; 5H029/AM04; 5H029/AM05;  
5H029/AM07; 5H029/BJ04; 5H029/BJ06; 5H029/CJ05;  
5H029/DJ02; 5H029/DJ03; 5H029/DJ05; 5H029/EJ01;  
5H040/AA18; 5H040/AS04; 5H040/AT04; 5H040/AY01;  
5H040/DD01; 5H040/JJ03; 5H040/JJ04; 5H040/NN03;  
5H050/AA15; 5H050/BA08; 5H050/BA17; 5H050/CA07;  
5H050/CA08; 5H050/CA09; 5H050/CB07; 5H050/DA09;  
5H050/DA20; 5H050/EA23; 5H050/GA07

- AB The battery is characterized by having excellent external insulation. The battery comprises an external packaging member consisting of a metal layer and laminated synthetic resin layers on its inside, an **electrode** laminated body having a pos. **electrode** plate and a neg. **electrode** plate with a separator in between sealed by the packaging member, and **electrode** terminals connected to the **electrode** body and exposed out off the packaging member. The battery group contains plural battery cells.
- ST manufg secondary battery automobile excellent external insulation
- IT Electric insulators  
(excellent external; manufacturing of secondary battery group for automobile having excellent external insulation)
- IT Automobiles  
Secondary batteries  
(manufacturing of secondary battery group for automobile having excellent external insulation)
- IT Ionomers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(manufacturing of secondary battery group for automobile having excellent external insulation)
- IT 39300-70-4, **Lithium nickel oxide**  
39457-42-6, **Lithium manganese oxide** 52627-24-4, **Lithium cobalt oxide**  
RL: TEM (Technical or engineered material use); USES (Uses)  
(composite **compound**; manufacturing of **secondary** battery group for automobile having excellent external insulation)
- IT 9002-88-4, **Polyethylene** 9003-07-0, **Polypropylene**  
RL: TEM (Technical or engineered material use); USES (Uses)  
(denaturation; manufacturing of secondary battery group for automobile having excellent external insulation)
- IT 7429-90-5, **Aluminum**, uses 7439-89-6, **Iron**, uses 7440-02-0, **Nickel**, uses 7440-50-8, **Copper**, uses  
RL: DEV (Device component use); USES (Uses)  
(manufacturing of secondary battery group for automobile having excellent external insulation)

*Applicant*

AN 2004:856882 HCAPLUS  
 DN 141:334946  
 ED Entered STN: 18 Oct 2004  
 TI **Cathode** active material for nonaqueous electrolyte  
 secondary battery  
 IN Hosoya, Yosuke; Yamamoto, Yoshikatsu  
 PA Sony Corporation, Japan  
 SO U.S. Pat. Appl. Publ., 13 pp.  
 CODEN: USXXCO  
 DT Patent  
 LA English  
 IC ICM H01G0004-008  
 INCL 361305000  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)  
 Section cross-reference(s): 49

## FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004201948	A1	20041014	US 2004-821323	20040409
JP 2004319105	A2	20041111	JP 2003-107509	20030411
KR 2004089545	A	20041021	KR 2004-24611	20040409
TW 240447	B1	20050921	TW 2004-93109992	20040409
CN 1571194	A	20050126	CN 2004-10071489	20040412

PRAI JP 2003-107509

A 20030411 &lt;--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004201948	ICM	H01G0004-008
	INCL	361305000
	IPCI	H01G0004-008 [ICM,7]
	IPCR	H01M0010-36 [I,C*]; H01M0010-40 [I,A]; H01G0004-008 [I,C*]; H01G0004-008 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]
JP 2004319105	NCL	361/305.000
	IPCI	H01M0004-58 [ICM,7]; H01M0004-02 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	H01G0004-008 [I,A]; H01G0004-008 [I,C*]; H01M0004-02 [I,A]; H01M0004-02 [I,C*]; H01M0004-48 [I,A]; H01M0004-48 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	FTERM	5H029/AJ02; 5H029/AK03; 5H029/AK18; 5H029/AL07; 5H029/AM03; 5H029/AM05; 5H029/AM07; 5H029/BJ02; 5H029/BJ14; 5H029/CJ21; 5H029/DJ16; 5H029/DJ17; 5H029/HJ01; 5H029/HJ05; 5H029/HJ13; 5H050/AA05; 5H050/AA12; 5H050/BA17; 5H050/CA07; 5H050/CA08; 5H050/CA29; 5H050/CB08; 5H050/FA05; 5H050/FA17;

5H050/FA18; 5H050/FA19; 5H050/GA22; 5H050/HA01;  
 5H050/HA05; 5H050/HA13  
 KR 2004089545 IPCI H01M0004-48 [ICM,7]  
 TW 240447 IPCI H01M0004-00 [ICS,7]; H01M0010-00 [ICS,7]  
 IPCR H01M0010-36 [I,C\*]; H01G0004-008 [I,C\*];  
 H01M0004-02 [I,C\*]; H01M0004-48 [I,C\*];  
 H01M0004-58 [I,C\*]; H01M0010-40 [I,A];  
 H01G0004-008 [I,A]; H01M0004-02 [I,A];  
 H01M0004-48 [I,A]; H01M0004-58 [I,A]  
 CN 1571194 IPCI H01M0004-48 [ICM,7]; H01M0004-58 [ICS,7];  
 H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C\*]  
 IPCR H01M0010-36 [I,C\*]; H01M0010-40 [I,A];  
 H01G0004-008 [I,C\*]; H01G0004-008 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-58 [I,C\*]; H01M0004-58 [I,A]  
 AB A pos. **electrode** active material includes particles  
 composed of a compound oxide; and coating layers composed of a compound  
 oxide formed on at least parts of the surfaces of the particles.  
 The particles have a layered structure and include a **first**  
**compound oxide** mainly composed of **lithium**  
 and **nickel**. The coating layers include a **second**  
**compound oxide** mainly composed of **lithium**  
 and **titanium**. The ratio by weight of the  
**first compound oxide** to the **second**  
**compound oxide** is between 96:4 and 65:35. The pos.  
**electrode** active material has a mean particle diam  
 . of 5 to 20  $\mu$  m.  
 ST **cathode** active material nonaq electrolyte secondary  
 battery  
 IT Battery **cathodes**  
 Secondary batteries  
 (cathode active material for nonaq. electrolyte  
 secondary battery)  
 IT 96-49-1, Ethylene carbonate 623-53-0, Ethyl methyl carbonate  
 13463-67-7, Titania, uses 21324-40-3, Lithium hexafluorophosphate  
 39300-70-4, Lithium nickel oxide 39302-37-9,  
 Lithium titanium oxide  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte  
 secondary battery)  
 IT 12031-82-2P, Lithium titanium oxide (Li2TiO3)  
 12031-95-7P, Lithium titanium oxide (Li4Ti5O12)  
 12163-02-9P, Lithium titanium oxide (Li2Ti3O7)  
 116327-68-5P, Cobalt lithium  
 nickel oxide (Co0.3LiNi0.7O2) 118819-40-2P  
 , Cobalt lithium manganese  
 oxide (Co0.7LiMn0.3O2) 144973-42-2P, Lithium  
 manganese nickel oxide (LiMn0.3Ni0.7O2) 193215-53-1P,  
 Cobalt lithium manganese nickel  
 oxide (Co0.2LiMn0.3Ni0.5O2) 219737-79-8P, Lithium  
 manganese titanium oxide (Li4Mn0.1Ti4.9O12).  
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP  
 (Preparation); USES (Uses)  
 (cathode active material for nonaq. electrolyte  
 secondary battery)  
 IT 39300-70-4, Lithium nickel oxide 39302-37-9,  
 Lithium titanium oxide  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte  
 secondary battery)  
 RN 39300-70-4 HCAPLUS  
 CN Lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
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Component	Ratio	Component Registry Number
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 39302-37-9 HCAPLUS  
CN Lithium titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Ti	x	7440-32-6
Li	x	7439-93-2

IT 12031-82-2P, Lithium titanium oxide (Li<sub>2</sub>TiO<sub>3</sub>)  
12031-95-7P, Lithium titanium oxide (Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>)  
12163-02-9P, Lithium titanium oxide (Li<sub>2</sub>Ti<sub>3</sub>O<sub>7</sub>)  
116327-68-5P, Cobalt lithium  
nickel oxide (Co<sub>0.3</sub>LiNi<sub>0.7</sub>O<sub>2</sub>) 118819-40-2P  
, Cobalt lithium manganese  
oxide (Co<sub>0.7</sub>LiMn<sub>0.3</sub>O<sub>2</sub>) 144973-42-2P, Lithium  
manganese nickel oxide (LiMn<sub>0.3</sub>Ni<sub>0.7</sub>O<sub>2</sub>) 193215-53-1P,  
Cobalt lithium manganese nickel  
oxide (Co<sub>0.2</sub>LiMn<sub>0.3</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 219737-79-8P, Lithium  
manganese titanium oxide (Li<sub>4</sub>Mn<sub>0.1</sub>Ti<sub>4.9</sub>O<sub>12</sub>)  
RL: DEV (Device component use); SPN (Synthetic preparation); PREP  
(Preparation); USES (Uses)  
(cathode active material for nonaq. electrolyte  
secondary battery)

RN 12031-82-2 HCAPLUS  
CN Lithium titanium oxide (Li<sub>2</sub>TiO<sub>3</sub>) (8CI, 9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	3	17778-80-2
Ti	1	7440-32-6
Li	2	7439-93-2

RN 12031-95-7 HCAPLUS  
CN Lithium titanium oxide (Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	12	17778-80-2
Ti	5	7440-32-6
Li	4	7439-93-2

RN 12163-02-9 HCAPLUS  
CN Lithium titanium oxide (Li<sub>2</sub>Ti<sub>3</sub>O<sub>7</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	7	17778-80-2
Ti	3	7440-32-6
Li	2	7439-93-2

RN 116327-68-5 HCAPLUS  
CN Cobalt lithium nickel oxide (Co<sub>0.3</sub>LiNi<sub>0.7</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O		
Ti		
Li		

O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.7	7440-02-0
Li	1	7439-93-2

RN 118819-40-2 HCAPLUS

CN Cobalt lithium manganese oxide (Co<sub>0.7</sub>LiMn<sub>0.3</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.7	7440-48-4
Mn	0.3	7439-96-5
Li	1	7439-93-2

RN 144973-42-2 HCAPLUS

CN Lithium manganese nickel oxide (LiMn<sub>0.3</sub>Ni<sub>0.7</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Ni	0.7	7440-02-0
Mn	0.3	7439-96-5
Li	1	7439-93-2

RN 193215-53-1 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.3</sub>Ni<sub>0.5</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.5	7440-02-0
Mn	0.3	7439-96-5
Li	1	7439-93-2

RN 219737-79-8 HCAPLUS

CN Lithium manganese titanium oxide (Li<sub>4</sub>Mn<sub>0.1</sub>Ti<sub>4.9</sub>O<sub>12</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	12	17778-80-2
Ti	4.9	7440-32-6
Mn	0.1	7439-96-5
Li	4	7439-93-2

L76 ANSWER 5 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:612042 HCAPLUS

DN 141:126397

ED Entered STN: 30 Jul 2004

TI Manganese nickel compound hydroxide particles and their preparation,  
 lithium manganese nickel compound  
 oxides, secondary lithium batteries  
 comprising same oxides as cathodes

IN Ito, Hiroyuki; Masukawa, Takaaki; Mukomoto, Ryuma; Shimakawa, Mamoru

PA Tanaka Chemical Corporation, Japan

SO Jpn. Kokai Tokkyo Koho, 12 pp.

CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C01G0053-00  
 ICS H01M0004-40; H01M0004-58; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 49

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004210560	A2	20040729	JP 2002-379506	20021227

PRAI JP 2002-379506

20021227 &lt;--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2004210560	ICM	C01G0053-00
	ICS	H01M0004-40; H01M0004-58; H01M0010-40
	IPCI	C01G0053-00 [ICM,7]; H01M0004-40 [ICS,7]; H01M0004-58 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	C01G0053-00 [I,A]; C01G0053-00 [I,C*]; H01M0004-40 [I,A]; H01M0004-40 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	FTERM	4G048/AA03; 4G048/AB02; 4G048/AC08; 4G048/AD03; 4G048/AE05; 5H029/AJ02; 5H029/AK03; 5H029/AL12; 5H029/AM01; 5H029/HJ01; 5H029/HJ05; 5H029/HJ07; 5H029/HJ13; 5H050/AA02; 5H050/BA16; 5H050/CA09; 5H050/CB12; 5H050/HA01; 5H050/HA05; 5H050/HA07; 5H050/HA10; 5H050/HA13

AB The Mn Ni compound hydroxide particles comprise 1:1 ratio of Mn and Ni, and 0.25-0.45 weight% of sulfate ions, and satisfy sp. surface area of 20-100 m<sup>2</sup>/g and prescribed x-ray diffraction data (definition given). The hydroxide particles are prepared by mixing and stirring aqueous solns. containing Mn salts and Ni salts (Mn:Ni = 1:1) with alkali solns. in aqueous solns. of pH 9-13 in the presence of complexing agents while keeping the degree of oxidation of Mn ions to coppt. Mn Ni hydroxide. The Mn Ni hydroxide particles and Li hydroxides are mixed and fired to give Li Mn Ni compound oxides (Mn:Ni = 1:1).

ST manganese nickel hydroxide prepn copptn; lithium manganese nickel oxide prepn firing hydroxide; battery cathode lithium manganese nickel oxide

IT Secondary batteries

(lithium; preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

IT Battery cathodes

Coprecipitation

(preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

IT 162684-16-4P, Lithium manganese nickel oxide

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(battery cathodes; preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

IT 302-01-2, Hydrazine, reactions

RL: RGT (Reagent); RACT (Reactant or reagent)

(complexing agent; in preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

IT 1310-73-2, Sodium hydroxide, processes 7785-87-7, Manganese sulfate 7786-81-4, Nickel sulfate

RL: CPS (Chemical process); PEP (Physical, engineering or chemical)

process); PROC (Process)

(in preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

IT 159374-49-9P, Manganese nickel hydroxide

RL: CPS (Chemical process); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)

(particles; preparation of Mn Ni hydroxide particles, and Li Mn Ni oxide for lithium battery cathodes)

L76 ANSWER 6 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2004:525186 HCAPLUS

DN 141:57119

ED Entered STN: 30 Jun 2004

TI Method for producing active material for cathode for nonaqueous electrolyte secondary battery

IN Kase, Katsuya; Kubo, Shigeki; Iisaka, Hirofumi; Nozaki, Ko; Suzuki, Satoru; Yamada, Manabu

PA Toyota Jidosha Kabushiki Kaisha, Japan

SO Eur. Pat. Appl., 14 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM H01M0004-02

ICS H01M0004-52; C01D0001-02; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1434288	A1	20040630	EP 2003-29322	20031218
<--				
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
KR 2004055676	A	20040626	KR 2003-93567	20031219
<--				
JP 2004214187	A2	20040729	JP 2003-422795	20031219
<--				
US 2004180263	A1	20040916	US 2003-739269	20031219
<--				
CN 1510775	A	20040707	CN 2003-10123294	20031222

PRAI JP 2002-370985

A 20021220 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1434288	ICM	H01M0004-02
	ICS	H01M0004-52; C01D0001-02; H01M0010-40
	IPCI	H01M0004-02 [ICM,7]; H01M0004-52 [ICS,7]; C01D0001-02 [ICS,7]; C01D0001-00 [ICS,7,C*]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	C01G0053-00 [I,C*]; C01G0053-00 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A];

H01M0004-50 [I,C\*]; H01M0004-50 [I,A];  
 H01M0004-52 [I,C\*]; H01M0004-52 [I,A];  
 H01M0010-36 [N,C\*]; H01M0010-40 [N,A]  
 ECLA C01G053/00D; H01M004/02B; H01M004/48B2;  
 H01M004/50B2; H01M004/52B2  
 KR 2004055676 IPCI H01M0004-58 [ICM,7]  
 JP 2004214187 IPCI H01M0004-58 [ICM,7]; H01M0004-02 [ICS,7];  
 H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C\*]  
 IPCR H01M0004-02 [I,A]; H01M0004-02 [I,C\*];  
 H01M0004-58 [I,A]; H01M0004-58 [I,C\*];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 FTERM 5H029/AJ02; 5H029/AK03; 5H029/AL12; 5H029/AM03;  
 5H029/AM05; 5H029/AM07; 5H029/CJ02; 5H029/CJ03;  
 5H029/CJ22; 5H029/CJ28; 5H029/HJ01; 5H029/HJ02;  
 5H029/HJ14; 5H050/AA06; 5H050/AA08; 5H050/BA16;  
 5H050/CA07; 5H050/CA08; 5H050/CA09; 5H050/CB12;  
 5H050/GA02; 5H050/GA03; 5H050/GA22; 5H050/GA27;  
 5H050/HA01; 5H050/HA02; 5H050/HA14  
 US 2004180263 IPCI H01M0004-52 [ICM,7]; H01M0004-48 [ICS,7];  
 H01M0004-50 [ICS,7]; C01G0051-04 [ICS,7];  
 C01G0051-00 [ICS,7,C\*]; C01G0053-04 [ICS,7];  
 C01G0053-00 [ICS,7,C\*]  
 IPCR C01G0053-00 [I,A]; C01G0053-00 [I,C\*]  
 NCL 429/231.300; 423/594.400; 423/594.600;  
 429/220.000; 429/221.000; 429/223.000;  
 429/224.000; 429/229.000; 429/231.000;  
 429/231.600  
 ECLA C01G053/00D; H01M004/02B; H01M004/48B2;  
 H01M004/50B2; H01M004/52B2  
 CN 1510775 IPCI H01M0004-48 [ICM,7]; H01M0004-58 [ICS,7];  
 C01G0001-02 [ICS,7]; C01G0051-00 [ICS,7];  
 C01G0053-00 [ICS,7]; C01D0015-00 [ICS,7]  
 IPCR C01G0053-00 [I,C\*]; C01G0053-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-50 [I,C\*]; H01M0004-50 [I,A];  
 H01M0004-52 [I,C\*]; H01M0004-52 [I,A];  
 H01M0010-36 [N,C\*]; H01M0010-40 [N,A]  
 ECLA C01G053/00D; H01M004/02B; H01M004/48B2;  
 H01M004/50B2; H01M004/52B2  
 AB A method of manufacturing a nonaq. electrolyte secondary battery is  
 provided wherein the pos. **electrode** is made from a  
 lithium-metal composite oxide represented by the general formula  
 $\text{Li}_x(\text{Ni}_{1-y}\text{Co}_y)\text{1-zMzO}_2$  ( $0.98 \leq x \leq 1.10$ ,  $0.05 \leq$   
 $y \leq 0.4$ ,  $0.01 \leq z \leq 0.2$ , in which M represents  
 at least one element selected from the group consisting of Al, Mg,  
 Mn, Ti, Fe, Cu, Zn and Ga), and having an average particle diam  
 . of 5  $\mu\text{m}$  to 10  $\mu\text{m}$ , a C-amount of 0.14 wt%  
 or less measured by way of the high-frequency heating-IR absorption  
 method, and a Karl Fischer moisture content of 0.2 wt% or less when  
 heated to 180° and the method comprising the steps of  
 applying a paste of active material for pos. **electrode** to  
**electrode** plate to make an **electrode**, then drying  
 the **electrode**, and pressing and then installing the  
**electrode** in a battery, in a work atmospheric having an absolute  
 moisture content of 10 g/m<sup>3</sup> or less.  
 ST **cathode** active material nonaq electrolyte secondary  
 battery  
 IT Secondary batteries  
 (lithium; method for producing active material for  
**cathode** for nonaq. electrolyte secondary battery)  
 IT Battery **cathodes**  
 (method for producing active material for **cathode** for  
 nonaq. electrolyte secondary battery)  
 IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate  
 7439-93-2, Lithium, uses 7791-03-9, Lithium perchlorate



120062-99-9, Cobalt copper lithium nickel oxide  
 177997-11-4, Cobalt gallium lithium nickel oxide  
 177997-13-6, Aluminum cobalt lithium nickel oxide  
 180997-14-2, Cobalt lithium magnesium nickel oxide  
 182442-95-1, Cobalt lithium manganese nickel oxide  
 182442-96-2, Cobalt iron lithium nickel oxide  
 191025-46-4, Cobalt lithium nickel zirconium oxide  
 244304-20-9, Cobalt lithium nickel titanium oxide

RL: DEV (Device component use); USES (Uses)

(method for producing active material for cathode for  
 nonaq. electrolyte secondary battery)

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE

- (1) Anon; PATENT ABSTRACTS OF JAPAN 1992, V016(201), PP-1352
- (2) Ellgen, P; US 5597664 A 1997 HCAPLUS
- (3) Japan Storage Battery Co Ltd; EP 1207575 A 2002 HCAPLUS
- (4) Ricoh Co Ltd; JP 04032877 A 1992
- (5) Sony Corp; EP 0462575 A 1991 HCAPLUS
- (6) Sony Corp; EP 1143549 A 2001 HCAPLUS

IT 120062-99-9, Cobalt copper lithium nickel oxide  
 177997-11-4, Cobalt gallium lithium nickel oxide  
 177997-13-6, Aluminum cobalt lithium nickel oxide  
 180997-14-2, Cobalt lithium magnesium nickel oxide  
 182442-95-1, Cobalt lithium manganese nickel oxide  
 182442-96-2, Cobalt iron lithium nickel oxide  
 191025-46-4, Cobalt lithium nickel zirconium oxide  
 244304-20-9, Cobalt lithium nickel titanium oxide

RL: DEV (Device component use); USES (Uses)

(method for producing active material for cathode for  
 nonaq. electrolyte secondary battery)

RN 120062-99-9 HCAPLUS

CN Cobalt copper lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Cu	x	7440-50-8
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-11-4 HCAPLUS

CN Cobalt gallium lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Ga	x	7440-55-3
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-13-6 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Al	x	7429-90-5

RN 180997-14-2 HCAPLUS  
 CN Cobalt lithium magnesium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2

RN 182442-95-1 HCAPLUS  
 CN Cobalt lithium manganese nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 182442-96-2 HCAPLUS  
 CN Cobalt iron lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Fe	x	7439-89-6

RN 191025-46-4 HCAPLUS  
 CN Cobalt lithium nickel zirconium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Zr	x	7440-67-7
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-20-9 HCAPLUS  
 CN Cobalt lithium nickel titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Co	x	7440-48-4
Ti	x	7440-32-6
Ni	x	7440-02-0
Li	x	7439-93-2

L76 ANSWER 7 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 2003:910330 HCAPLUS  
 DN 139:397959  
 ED Entered STN: 21 Nov 2003  
 TI Cathode containing lithium manganese compound

oxides for secondary battery having excellent high-temperature cycle property and storage property  
 IN Numata, Tatsuji; Kumeuchi, Tomokazu; Kawasaki, Daisuke  
 PA NEC Corp., Japan  
 SO Jpn. Kokai Tokkyo Koho, 11 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0004-02  
 ICS H01M0004-58; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003331824	A2	20031121	JP 2002-135183	20020510

PRAI JP 2002-135183

20020510 &lt;--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003331824	ICM	H01M0004-02
	ICS	H01M0004-58; H01M0010-40
	IPCI	H01M0004-02 [ICM,7]; H01M0004-58 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	H01M0010-36 [I,C*]; H01M0010-40 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]
AB		The <b>cathode</b> for secondary battery contains a Li-occluding and releasing <b>cathode</b> active material particles containing Mn and coated with spinel type Li Mn compound oxide $\text{LiMn}_2\text{-aNiMbO}_4$ ( $0.45 \leq a \leq 0.55$ , $0 \leq b \leq 0.3$ , M=Si and/or Ti). In the <b>cathode</b> , leaching of Mn from the <b>cathode</b> active material is prevented. The secondary battery having excellent high-temperature cycle property and storage property is provided with the <b>cathode</b> and anode arranged by facing to the <b>cathode</b> through an electrolyte.
ST		lithium manganese oxide <b>cathode</b> secondary battery
IT		Battery <b>cathodes</b> Secondary batteries ( <b>cathode</b> containing lithium manganese compound oxides for secondary battery having excellent high-temperature cycle property and storage property)
IT		7782-42-5, Graphite, uses RL: TEM (Technical or engineered material use); USES (Uses) (anode active material; <b>cathode</b> containing lithium manganese compound oxides for secondary battery having excellent high-temperature cycle property and storage property)
IT		12031-75-3, Lithium manganese nickel oxide ( $\text{Li}_2\text{Mn}_3\text{NiO}_8$ ) 12057-17-9, Lithium manganese oxide ( $\text{LiMn}_2\text{O}_4$ ) 113066-89-0, Cobalt lithium nickel oxide ( $\text{Co}_0.2\text{LiNi}_0.8\text{O}_2$ ) 155472-68-7, Lithium manganese oxide ( $\text{Li}_{1.1}\text{Mn}_{1.9}\text{O}_4$ ) 156912-63-9, Lithium manganese oxide ( $\text{Li}_{1.03}\text{Mn}_{1.97}\text{O}_4$ ) 172922-65-5, Lithium manganese oxide ( $\text{Li}_{1.06}\text{Mn}_{1.94}\text{O}_4$ ) 173390-83-5, Lithium manganese oxide ( $\text{Li}_{1.08}\text{Mn}_{1.92}\text{O}_4$ ) 176979-23-0, Lithium manganese oxide ( $\text{Li}_{1.15}\text{Mn}_{1.85}\text{O}_4$ ) 176979-25-2, Lithium manganese oxide ( $\text{Li}_{1.2}\text{Mn}_{1.8}\text{O}_4$ ) 200943-61-9, Lithium manganese oxide ( $\text{Li}_{1.18}\text{Mn}_{1.82}\text{O}_4$ ) 508200-26-8, Lithium manganese nickel titanium oxide ( $\text{LiMn}_{1.4}\text{Ni}_{0.5}\text{Ti}_{0.1}\text{O}_4$ ) 625129-59-1, Lithium manganese nickel oxide silicate ( $\text{LiMn}_{1.4}\text{Ni}_{0.5}\text{O}_{3.6}(\text{SiO}_4)_{0.1}$ )

RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode containing lithium manganese  
 compound oxides for secondary battery  
 having excellent high-temperature cycle property and storage property)

IT 7440-44-0, Carbon, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
 (hard, anode active material; cathode containing lithium  
 manganese compound oxides for secondary  
 battery having excellent high-temperature cycle property and storage  
 property)

IT 12031-75-3, Lithium manganese nickel  
 oxide (Li<sub>2</sub>Mn<sub>3</sub>NiO<sub>8</sub>) 113066-89-0, Cobalt lithium  
 nickel oxide (Co<sub>0.2</sub>LiNi<sub>0.8</sub>O<sub>2</sub>) 508200-26-8,  
 Lithium manganese nickel titanium oxide  
 (LiMn<sub>1.4</sub>Ni<sub>0.5</sub>Ti<sub>0.1</sub>O<sub>4</sub>) 625129-59-1, Lithium  
 manganese nickel oxide silicate  
 (LiMn<sub>1.4</sub>Ni<sub>0.5</sub>O<sub>3.6</sub>(SiO<sub>4</sub>)<sub>0.1</sub>)

RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode containing lithium manganese  
 compound oxides for secondary battery  
 having excellent high-temperature cycle property and storage property)

RN 12031-75-3 HCAPLUS

CN Lithium manganese nickel oxide (Li<sub>2</sub>Mn<sub>3</sub>NiO<sub>8</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	8	17778-80-2
Ni	1	7440-02-0
Mn	3	7439-96-5
Li	2	7439-93-2

RN 113066-89-0 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.2</sub>LiNi<sub>0.8</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.8	7440-02-0
Li	1	7439-93-2

RN 508200-26-8 HCAPLUS

CN Lithium manganese nickel titanium oxide (LiMn<sub>1.4</sub>Ni<sub>0.5</sub>Ti<sub>0.1</sub>O<sub>4</sub>) (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
Ti	0.1	7440-32-6
Ni	0.5	7440-02-0
Mn	1.4	7439-96-5
Li	1	7439-93-2

RN 625129-59-1 HCAPLUS

CN Lithium manganese nickel oxide silicate (LiMn<sub>1.4</sub>Ni<sub>0.5</sub>O<sub>3.6</sub>(SiO<sub>4</sub>)<sub>0.1</sub>)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.6	17778-80-2
O <sub>4</sub> Si	0.1	17181-37-2
Ni	0.5	7440-02-0

Mn	1.4	7439-96-5
Li	1	7439-93-2

L76 ANSWER 8 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 2003:194473 HCAPLUS  
 DN 138:223668  
 ED Entered STN: 12 Mar 2003  
 TI Production of nickel-manganese oxide compounds for secondary batteries  
 IN Fujii, Yasuhiro  
 PA Tosoh Corp., Japan  
 SO Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM C01G0053-00  
 ICS H01M0004-58; H01M0010-40  
 CC 49-3 (Industrial Inorganic Chemicals)  
 Section cross-reference(s): 52  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003073127	A2	20030312	JP 2001-260382	20010829

PRAI JP 2001-260382 20010829 <--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003073127	ICM	C01G0053-00
	ICS	H01M0004-58; H01M0010-40
	IPCI	C01G0053-00 [ICM,7]; H01M0004-58 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	C01G0053-00 [I,C*]; C01G0053-00 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The intermediate has the general formula  $\text{Ni}_1\text{-xMn}_x(\text{OH})_y(\text{COO})_z \cdot n\text{H}_2\text{O}$  ( $0 \leq x \leq 0.55$ ,  $y+z = 2$ ,  $0.5 \leq z \leq 1.5$ ,  $n \geq 0$ ). The mole ratio of the reactants is  $0.25 \leq A/B \leq 0.75$  where A is sum of Ni and Mn, B is  $(\text{NH}_4)_2\text{C}_2\text{O}_4$ . Ni salt, Mn salt, and  $(\text{NH}_4)_2\text{C}_2\text{O}_4$  are mixed, filtered, dried, impregnated with Li salt to maintain the mole ratio  $0.95 \leq C/A \leq 1.10$  where C is Li, and calcined under  $\text{O}_2$  at  $750\text{-}1050^\circ$ . The composition of Ni, Mn, and Li can be modified, and is suitable for precursors of **cathode** active material of secondary batteries.

ST nickel manganese lithium **cathode** secondary battery  
 IT Calcination

**Cathodes**

Secondary batteries

(production of nickel-manganese oxide compds. for secondary batteries)

IT Carbon black, reactions

Fluoropolymers, reactions

RL: RCT (Reactant); RACT (Reactant or reagent)

(production of nickel-manganese oxide compds. for secondary batteries)

IT 12031-65-1P, **Lithium nickel** oxide ( $\text{LiNiO}_2$ )

128975-24-6P, **Lithium manganese nickel** oxide

( $\text{Li}_2\text{MnNiO}_4$ ) 144973-38-6P, **Lithium manganese**

**nickel** oxide ( $\text{Li}_{1.1}\text{Mn}_{0.2}\text{Ni}_{0.8}\text{O}_2$ )

RL: IMF (Industrial manufacture); PUR (Purification or recovery);

PREP (Preparation)

(production of nickel-manganese oxide compds. for  
secondary batteries)

IT 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate  
546-89-4, Lithium acetate 553-91-3, Lithium  
oxalate 1113-38-8, Ammonium oxalate 1310-65-2, Lithium hydroxide  
(Li(OH)) 7718-54-9, Nickel chloride (NiCl<sub>2</sub>), reactions  
7773-01-5, Manganese chloride (MnCl<sub>2</sub>) 7785-87-7, Manganese sulfate  
7786-81-4, Nickel sulfate 9002-84-0, Poly tetrafluoro ethylene  
10377-66-9, Manganese nitrate 13138-45-9, Nickel nitrate  
21324-40-3, Lithium hexafluorophosphate  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(production of nickel-manganese oxide  
compds. for secondary batteries)

L76 ANSWER 9 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
AN 2003:97138 HCAPLUS  
DN 138:156266  
ED Entered STN: 07 Feb 2003  
TI Production of lithium nickel manganese  
compound oxides for secondary lithium  
battery cathodes by firing their raw material mixtures  
IN Kikuchi, Kazuhiro; Tsurita, Yasushi  
PA Mitsubishi Chemical Corp., Japan  
SO Jpn. Kokai Tokkyo Koho, 10 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM C01G0053-00  
ICS H01M0004-58; H01M0010-40  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
Technology)  
Section cross-reference(s): 49

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003034538	A2	20030207	JP 2002-138827	200205 14
JP 2001-147662	A	20010517	<--	
JP 2001-147663	A	20010517	<--	
JP 2001-147664	A	20010517	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003034538	ICM	C01G0053-00
	ICS	H01M0004-58; H01M0010-40
	IPCI	C01G0053-00 [ICM,7]; H01M0004-58 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	C01G0053-00 [I,C*]; C01G0053-00 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
AB		In production of the lithium nickel manganese compound oxides by firing their raw material mixts., slurries containing at least the nickel- and manganese sources are spray atomized to give powder with average particle size $\leq 2 \mu\text{m}$ which is used as the raw materials. The slurries may further contain Li sources. The oxides may be expressed by $\text{Li}_x\text{Ni}_y\text{Mn}_z\text{Q}(\text{1-Y-Z})\text{O}_2$ ( $0 < x \leq 1.2$ ; $y/z = 0.7-9$ ; $y$ $+ z = 0.5-1.0$ ; Q = Mg, Al, Ca, Fe, Co). The produced oxides have single phase.
ST		lithium nickel manganese oxide manuf battery cathode; slurry spraying firing manuf lithium nickel manganese oxide
IT		Transition metal halides RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

- (manganese halides, slurry component; in production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT Transition metal halides  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)  
 (nickel halides, slurry component; in production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT Firing (heat treating)  
 (production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT Battery **cathodes**  
 (secondary **lithium** battery; production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT 162684-16-4P, **Lithium manganese nickel oxide**  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (battery **cathodes**; production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT 495464-12-5P  
 RL: DEV (Device component use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)  
 (battery **cathodes**; production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)
- IT 546-89-4, **Lithium acetate** 554-13-2, **Lithium carbonate** 598-62-9, **Manganese carbonate** 1310-65-2, **Lithium hydroxide** 1313-13-9, **Manganese oxide (mno2)**, processes 1313-99-1, **Nickel oxide (nio)**, processes 1317-34-6, **Manganese oxide (mn2o3)** 1317-35-7, **Manganese oxide (mn3o4)** 3333-67-3, **Nickel carbonate (nico3)** 7785-87-7, **Manganese sulfate** 7786-81-4, **Nickel sulfate** 7790-69-4, **Lithium nitrate** 10377-66-9, **Manganese nitrate** [Mn(NO3)2] 12054-48-7, **Nickel hydroxide** 12626-88-9, **Manganese hydroxide** 12710-12-2, **Manganese oxyhydroxide** 13138-45-9, **Nickel nitrate** 55070-72-9, **Nickel oxide hydroxide**  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)  
 (slurry component; in production of **lithium nickel manganese compound oxides** for **secondary** lithium battery **cathodes** by firing of raw material mixts. containing powder obtained by spray atomization of slurries)

L76 ANSWER 10 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2003:40437 HCAPLUS

DN 138:109577

ED Entered STN: 17 Jan 2003

TI Solid secondary lithium battery

IN Ogata, Naoya; Sata, Tsutomu

PA Torekion K. K., Japan

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent  
 LA Japanese  
 IC ICM H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2003017121	A2	20030117	JP 2001-200782	20010702

PRAI JP 2001-200782

20010702 &lt;--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2003017121	ICM	H01M0010-40
	IPCI	H01M0010-40 [ICM,7]; H01M0010-36 [ICM,7,C*]
	IPCR	H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The battery has a Li or Li-intercalating anode, a Li-intercalating cathode, and a solid electrolyte in between; where the electrolyte is a solution containing a Li salt in a room temperature solid aromatic carbonate. Another type of the battery has a solid polymer electrolyte containing a crosslinked polyether polymer matrix and the above solution as continuous phase in the matrix.

ST Secondary Li battery polymer polyether solid carbonate electrolyte  
 IT Secondary batteries

(lithium; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

IT 7782-42-5, Graphite, uses 12031-95-7, Lithium titanium oxide (Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>)

RL: DEV (Device component use); USES (Uses)  
 (anode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

IT 12190-79-3, Cobalt lithium oxide (CoLiO<sub>2</sub>) 15365-14-7, Iron lithium phosphate (LiFePO<sub>4</sub>)

RL: DEV (Device component use); USES (Uses)  
 (cathode; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

IT 79-10-7D, Acrylic acid, polyoxyalkylene derivs. 115383-11-4

RL: DEV (Device component use); USES (Uses)  
 (compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

IT 82113-65-3, Bis(trifluoromethane sulfonyl) imide 90076-65-6

RL: DEV (Device component use); USES (Uses)  
 (salt, electrolyte; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

IT 6222-20-4 486459-47-6

RL: DEV (Device component use); USES (Uses)  
 (solvent, electrolyte; compns. and structure of secondary Li batteries containing Li-intercalating electrodes and solid polymer electrolyte solns.)

L76 ANSWER 11 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:693372 HCAPLUS

DN 137:235195

ED Entered STN: 13 Sep 2002

TI Cathode active mass for secondary nonaqueous electrolyte battery and its manufacture

IN Katsurao, Ryuichi; Abe, Isao



PA Sumitomo Metal Mining Co., Ltd., Japan  
 SO Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0004-58  
 ICS C01G0053-00; H01M0004-02; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2002260660	A2	20020913	JP 2001-60626	20010305

JP 3835180 B2 20061018  
 PRAI JP 2001-60626 20010305 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2002260660	ICM	H01M0004-58
	ICS	C01G0053-00; H01M0004-02; H01M0010-40
	IPCI	H01M0004-58 [I,A]; C01G0053-00 [I,A]; H01M0004-02 [I,A]; H01M0010-40 [I,A]; H01M0010-36 [I,C*]
	IPCR	C01G0053-00 [I,C*]; C01G0053-00 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The **cathode** active mass is LiMO<sub>2</sub> (M = Ni or Ni and ≥1 transition metal) containing a V compound The V compound is preferably Li<sub>3</sub>VO<sub>4</sub> on or near the surface of the LiMO<sub>2</sub>. The active mass is prepared by mixing a Li compound with a Mn compound, which is premixed with a V compound, and heating the mixture; or by adding a V compound to LiMO<sub>2</sub> by immersing the LiMO<sub>2</sub> in a melted V compound or in a solution of the V compound

ST secondary battery **cathode** lithium nickel oxide vanadium compd

IT Battery **cathodes**  
 (compsns. and manufacture of substituted lithium nickel oxide containing vanadium compds.  
 for secondary lithium battery **cathodes**)

IT 15593-56-3P, Lithium vanadium oxide (Li<sub>3</sub>VO<sub>4</sub>) 457887-01-3P, Aluminum cobalt lithium nickel oxide (Al<sub>0.03</sub>Co<sub>0.14</sub>LiNi<sub>0.83</sub>O<sub>2</sub>)  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (compsns. and manufacture of substituted lithium nickel oxide containing vanadium compds.  
 for secondary lithium battery **cathodes**)

L76 ANSWER 12 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2001:360318 HCAPLUS

DN 134:355474

ED Entered STN: 18 May 2001

TI Battery **electrodes** including particles of specific sizes

IN Buckley, James P.; Gbantous, Dania I.; Hoang, Khanh; Horne, Craig R.; Bi, Xiangxin

PA Nanogram Corporation, USA

SO PCT Int. Appl., 78 pp.

CODEN: PIXXD2

DT Patent

LA English

IC ICM H01M0004-36

CC 52-2 (Electrochemical, Radiational, and Thermal Energy

Technology)  
FAN.CNT 30

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001035473	A1	20010517	WO 2000-US30543	20001106
<--				
W: CN, IN, JP, KR				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
EP 1249047	A1	20021016	EP 2000-979141	20001106
<--				
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
JP 2003514353	T2	20030415	JP 2001-537112	20001106
<--				
TW 488100	B	20020521	TW 2000-89123615	20001108
<--				
CN 1531480	A	20040922	CN 2001-820305	20011026
<--				
PRAI US 1999-435748	A	19991108	<--	
US 2000-243491P	P	20001026	<--	
WO 2000-US30543	W	20001106	<--	

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2001035473	ICM	H01M0004-36
	IPCI	H01M0004-36 [ICM,7]
	IPCR	H01M0004-66 [I,C*]; H01M0004-66 [I,A]; H01M0002-16 [I,C*]; H01M0002-16 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-06 [I,C*]; H01M0004-06 [I,A]; H01M0004-40 [I,C*]; H01M0004-40 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0004-62 [I,C*]; H01M0004-62 [I,A]; H01M0006-16 [I,C*]; H01M0006-16 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
EP 1249047	ECLA	H01M004/02
	IPCI	H01M0004-36 [ICM,6]
	IPCR	H01M0004-66 [I,C*]; H01M0004-66 [I,A]; H01M0002-16 [I,C*]; H01M0002-16 [I,A]; H01M0004-02 [I,C*]; H01M0004-02 [I,A]; H01M0004-06 [I,C*]; H01M0004-06 [I,A]; H01M0004-40 [I,C*]; H01M0004-40 [I,A]; H01M0004-48 [I,C*]; H01M0004-48 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]; H01M0004-62 [I,C*]; H01M0004-62 [I,A]; H01M0006-16 [I,C*]; H01M0006-16 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
JP 2003514353	IPCI	H01M0004-02 [ICM,7]; H01M0002-16 [ICS,7]; H01M0004-06 [ICS,7]; H01M0004-40 [ICS,7]; H01M0004-48 [ICS,7]; H01M0004-58 [ICS,7]; H01M0004-62 [ICS,7]; H01M0004-66 [ICS,7]; H01M0006-16 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]

TW 488100 IPCR H01M0004-02 [I,A]; H01M0004-02 [I,C\*]  
 IPCI H01M0004-04 [ICM,7]  
 IPCR H01M0004-66 [I,C\*]; H01M0004-66 [I,A];  
 H01M0002-16 [I,C\*]; H01M0002-16 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-06 [I,C\*]; H01M0004-06 [I,A];  
 H01M0004-40 [I,C\*]; H01M0004-40 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-58 [I,C\*]; H01M0004-58 [I,A];  
 H01M0004-62 [I,C\*]; H01M0004-62 [I,A];  
 H01M0006-16 [I,C\*]; H01M0006-16 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 CN 1531480 IPCI B32B0009-04 [ICM,7]; B05D0005-00 [ICS,7];  
 B05D0001-36 [ICS,7]; C08J0007-18 [ICS,7];  
 C08J0007-00 [ICS,7,C\*]; G02B0006-00 [ICS,7];  
 G02B0006-02 [ICS,7]; G02B0006-10 [ICS,7]  
 IPCR B29D0011-00 [I,C\*]; B29D0011-00 [I,A];  
 C03B0019-00 [I,C\*]; C03B0019-14 [I,A];  
 C03B0037-012 [I,C\*]; C03B0037-012 [I,A];  
 C03B0037-014 [I,C\*]; C03B0037-014 [I,A];  
 C03B0037-02 [I,C\*]; C03B0037-027 [I,A];  
 C04B0035-14 [I,C\*]; C04B0035-14 [I,A];  
 C23C0016-48 [I,C\*]; C23C0016-48 [I,A];  
 C23C0026-00 [I,C\*]; C23C0026-00 [I,A];  
 C23C0028-00 [I,C\*]; C23C0028-00 [I,A];  
 C23C0028-04 [I,C\*]; C23C0028-04 [I,A];  
 G02B0001-00 [I,C\*]; G02B0001-02 [I,A];  
 G02B0001-04 [I,C\*]; G02B0001-04 [I,A];  
 G02B0006-12 [I,C\*]; G02B0006-12 [I,A];  
 G02B0006-13 [I,C\*]; G02B0006-13 [I,A];  
 G02B0006-132 [I,A]; G02B0006-43 [N,C\*];  
 G02B0006-43 [N,A]  
 ECLA C23C028/04; C03B019/14B2; C03B037/014B2;  
 C04B035/14; C23C028/00; G02B006/02C; G02B006/13;  
 G02B006/132  
 AB Embodiments of **electrodes** include a collection of  
 particles having an average diameter less than about 100 nm and have a root  
 mean square surface roughness less than about one micron.  
**Electrodes** can be formed with a collection of electroactive  
 nanoparticles having a narrow particle size distribution.  
**Electrodes** can be formed having an average thickness less than  
 about 10  $\mu$  m that include particles having an average  
 diameter less than about 100 nm. Thin **electrodes** can  
 be used in the formation of thin batteries in which at least one of  
 the **electrodes** includes nanoscale electroactive particles.  
 ST battery **electrode** nanoparticle  
 IT Battery anodes  
 Battery **cathodes**  
 Nanoparticles  
 Particle size distribution  
 Surface roughness  
 (battery **electrodes** including particles of specific  
 sizes)  
 IT Carbon fibers, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use); USES  
 (Uses)  
 (battery **electrodes** including particles of specific  
 sizes)  
 IT Metals, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use); USES  
 (Uses)  
 (particles; battery **electrodes** including particles of  
 specific sizes)  
 IT Thermal decomposition  
 (photo-; battery **electrodes** including particles of  
 specific sizes)

IT Lithium alloy, base  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (battery **electrodes** including particles of specific sizes)

IT 1332-29-2, Tin oxide 11099-11-9, Vanadium oxide 11105-02-5, Silver vanadium oxide 11126-12-8, Iron sulfide 11126-15-1, Lithium vanadium oxide 11129-60-5, Manganese oxide 12612-50-9, Molybdenum sulfide 13463-67-7, Titanium oxide, uses 39300-70-4, Lithium nickel oxide 39302-37-9, Lithium titanium oxide 39457-42-6, Lithium Manganese oxide 52627-24-4, Cobalt lithium oxide 80341-49-7, Iron lithium sulfide 121339-43-3, Lithium Silver vanadium oxide 160479-36-7, Lithium tin oxide  
 RL: DEV (Device component use); USES (Uses)  
 (battery **electrodes** including particles of specific sizes)

IT 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)  
 (battery **electrodes** including particles of specific sizes)

IT 7439-93-2, Lithium, uses  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (battery **electrodes** including particles of specific sizes)

IT 7429-90-5, Aluminum, uses 7440-50-8, Copper, uses 12597-68-1, Stainless steel, uses  
 RL: DEV (Device component use); USES (Uses)  
 (current collector; battery **electrodes** including particles of specific sizes)

IT 7439-93-2D, Lithium, intercalation compound, uses  
 RL: DEV (Device component use); USES (Uses)  
 (particles; battery **electrodes** including particles of specific sizes)

RE.CNT 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD  
 RE  
 (1) Bi; US 5952125 A 1999 HCAPLUS  
 (2) Fetcenko; US 5536591 A 1996 HCAPLUS  
 (3) Izumi; US 5962156 A 1999 HCAPLUS  
 (4) Kawakami; US 5641591 A 1997 HCAPLUS  
 (5) Yamada; US 5482797 A 1996 HCAPLUS

IT 39300-70-4, Lithium nickel oxide 39302-37-9, Lithium titanium oxide  
 RL: DEV (Device component use); USES (Uses)  
 (battery **electrodes** including particles of specific sizes)

RN 39300-70-4 HCAPLUS  
 CN Lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 39302-37-9 HCAPLUS  
 CN Lithium titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Ti	x	7440-32-6

Li | x | 7439-93-2

L76 ANSWER 13 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 2001:655026 HCAPLUS  
 DN 135:229342  
 ED Entered STN: 07 Sep 2001  
 TI Lithium secondary batteries having excellent high-temperature cycle characteristics and high-temperature storage characteristics  
 IN Takeuchi, Yoji; Okuda, Takuaki; Nakano, Hideyuki; Kobayashi, Tetsuro; Sasaki, Iwao; Mukai, Kazuhiko; Ukyo, Yoshio  
 PA Toyota Central Research and Development Laboratories, Inc., Japan  
 SO Jpn. Kokai Tokkyo Koho, 13 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0004-58  
 ICS H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 57

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001243952	A2	20010907	JP 2000-53747	20000229

PRAI JP 2000-53747

20000229 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001243952	ICM	H01M0004-58
	ICS	H01M0010-40
	IPCI	H01M0004-58 [ICM,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	H01M0010-36 [I,C*]; H01M0010-40 [I,A]; H01M0004-58 [I,C*]; H01M0004-58 [I,A]
AB		The batteries comprise (A) lithium nickel mixed oxide cathodes having composition formula $Li_{1-x}AxNi_{1-y}MyO_2$ ( $A = \geq 1$ of alkali metal excluding Li, alkaline earth metal; $M = Co, Mn, Al, Cr, Fe, V, Ti$ , and/or $Ga$ ; $x = 0-0.2$ ; $y = 0.05-0.5$ ) and forming secondary particles by agglomeration of primary particles having average diameter $\geq 0.5 \mu m$ and (B) lithium titanium mixed oxide anodes having composition formula $Li_aTi_bO_4$ ( $a = 0.5-3$ ; $b = 1-2.5$ ). The batteries are manufactured at low cost.
ST		secondary lithium battery thermal cycle characteristic; cathode lithium nickel mixed oxide battery; anode lithium titanium oxide battery
IT		Battery anodes Battery cathodes (lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel mixed oxide secondary particle cathodes and lithium titanium oxide anodes)
IT		Secondary batteries (lithium; lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel mixed oxide secondary particle cathodes and lithium titanium oxide anodes)
IT		12031-95-7, Lithium titanium oxide (Li4Ti5O12) 37217-08-6, Lithium titanium oxide (LiTi2O4) RL: DEV (Device component use); USES (Uses) (anode active material; lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel

mixed oxide secondary particle cathodes and lithium titanium oxide anodes)

IT 190902-65-9, Lithium manganese nickel oxide (LiMn0.15Ni0.85O2) 190902-70-6, Cobalt lithium manganese nickel oxide (Co0.1LiMn0.05Ni0.85O2) 193214-22-1, Aluminum cobalt lithium nickel oxide (Al0.05Co0.1LiNi0.85O2)

RL: DEV (Device component use); USES (Uses) (cathode active material; lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel mixed oxide secondary particle cathodes and lithium titanium oxide anodes)

IT 12031-95-7, Lithium titanium oxide (Li4Ti5O12) 37217-08-6, Lithium titanium oxide (LiTi2O4)

RL: DEV (Device component use); USES (Uses) (anode active material; lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel mixed oxide secondary particle cathodes and lithium titanium oxide anodes)

RN 12031-95-7 HCAPLUS

CN Lithium titanium oxide (Li4Ti5O12) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	12	17778-80-2
Ti	5	7440-32-6
Li	4	7439-93-2

RN 37217-08-6 HCAPLUS

CN Lithium titanium oxide (LiTi2O4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ti	2	7440-32-6
Li	1	7439-93-2

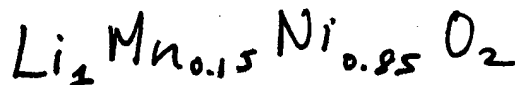
IT 190902-65-9, Lithium manganese nickel oxide (LiMn0.15Ni0.85O2) 190902-70-6, Cobalt lithium manganese nickel oxide (Co0.1LiMn0.05Ni0.85O2) 193214-22-1, Aluminum cobalt lithium nickel oxide (Al0.05Co0.1LiNi0.85O2)

RL: DEV (Device component use); USES (Uses) (cathode active material; lithium secondary batteries having excellent high-temp.characteristics comprising lithium nickel mixed oxide secondary particle cathodes and lithium titanium oxide anodes)

RN 190902-65-9 HCAPLUS

CN Lithium manganese nickel oxide (LiMn0.15Ni0.85O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.85	7440-02-0
Mn	0.15	7439-96-5
Li	1	7439-93-2



RN 190902-70-6 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.1LiMn0.05Ni0.85O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.85	7440-02-0
Mn	0.05	7439-96-5
Li	1	7439-93-2

RN 193214-22-1 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (Al0.05Co0.1LiNi0.85O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.85	7440-02-0
Li	1	7439-93-2
Al	0.05	7429-90-5

L76 ANSWER 14 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2001:185144 HCAPLUS

DN 134:225061

ED Entered STN: 16 Mar 2001

TI Cathode active material for a nonaqueous electrolyte battery

IN Kuyama, Junji; Nagamine, Masayuki

PA Sony Corporation; Japan

SO Eur. Pat. Appl., 9 pp.

CODEN: EPXXDW

DT Patent

LA English

IC ICM H01M0004-50

ICS H01M0004-48

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI      EP 1083615                      A2      20010314                      EP 2000-119279

200009  
06

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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO

JP 2001076727      A2      20010323      JP 1999-254589

199909  
08

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TW 478200 B 20020301 TW 2000-89118243

200009  
06

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CN 1287390                  A                  20010314                  CN 2000-126939

200009  
08

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PRAI JP 1999-254589                    A                    19990908    <--

**CLASS**

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
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EP 1083615 ICM H01M0004-50  
 ICS H01M0004-48  
 IPCI H01M0004-50 [ICM,6]; H01M0004-48 [ICS,6]  
 IPCR H01M0004-58 [I,C\*]; H01M0004-58 [I,A];  
 C01G0045-00 [I,C\*]; C01G0045-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-50 [I,C\*]; H01M0004-50 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 ECLA C01G045/00; C01G045/00D; H01M004/48B2;  
 H01M004/50B2

JP 2001076727 IPCI H01M0004-58 [ICM,7]; H01M0004-02 [ICS,7];  
 H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C\*]  
 IPCR C01G0045-00 [I,A]; C01G0045-00 [I,C\*];  
 H01M0004-48 [I,A]; H01M0004-48 [I,C\*];  
 H01M0004-50 [I,A]; H01M0004-50 [I,C\*]

TW 478200 IPCI H01M0004-58 [ICM,7]  
 IPCR H01M0004-58 [I,C\*]; H01M0004-58 [I,A];  
 C01G0045-00 [I,C\*]; C01G0045-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-50 [I,C\*]; H01M0004-50 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]

CN 1287390 IPCI H01M0004-48 [ICM,7]; H01M0004-58 [ICS,7];  
 H01M0010-36 [ICS,7]  
 IPCR H01M0004-58 [I,C\*]; H01M0004-58 [I,A];  
 C01G0045-00 [I,C\*]; C01G0045-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-50 [I,C\*]; H01M0004-50 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]

AB The present invention enables to obtain both of a cycle  
 characteristic and a high load characteristic. The invention  
 discloses a pos. **electrode** active material containing lithium  
 composite manganese oxide having a spinel structure for a nonaq.  
 electrolyte cell and a nonaq. electrolyte cell using this material.  
 The lithium composite manganese oxide having spinel structure has  
 its primary particle ~~diameter~~ not less than 0.05  $\mu$ m  
 .m and not greater than 10  $\mu$  m, forming an aggregate,  
 and a sp. surface measured by the BET method in a range not less  
 than 0.2 m<sup>2</sup>/g and not greater than 2 m<sup>2</sup>/g.

ST battery **cathode** lithium composite manganese oxide  
 IT Battery **cathodes**  
 Sintering  
 (cathode active material for nonaq. electrolyte  
 battery)

IT Coke  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte  
 battery)

IT Carbon fibers, uses  
 Carbonaceous materials (technological products)  
 Polyacenes  
 Polymers, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use); PEP  
 (Physical, engineering or chemical process); PROC (Process); USES  
 (Uses)  
 (cathode active material for nonaq. electrolyte  
 battery)

IT Fluoropolymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode active material for nonaq. electrolyte  
 battery)

IT Secondary batteries  
 (lithium; **cathode** active material for nonaq.  
 electrolyte battery)



IT Lithium alloy, base  
 RL: DEV (Device component use); MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (cathode active material for nonaq. electrolyte battery)

IT 75-05-8, Acetonitrile, uses 96-47-9, 2-Methyl tetrahydrofuran 96-48-0,  $\gamma$ -Butyrolactone 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 109-99-9, Thf, uses 110-71-4, 1,2-Dimethoxyethane 126-33-0, Sulfolane 623-96-1, Dipropyl carbonate 646-06-0, 1,3-Dioxolane 2550-62-1, Methanesulfonic acid, lithium salt 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide 7791-03-9, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate 14485-20-2, Lithium tetraphenylborate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 130811-80-2, Lithium manganese nickel oxide (LiMn1.8Ni0.2O4) 329689-73-8, Lithium manganese titanium oxide (Li0.9-1.4Mn1.7-2Ti0-0.3O4) 329689-74-9, Lithium manganese vanadium oxide (Li0.9-1.4Mn1.7-2V0-0.3O4) 329689-76-1, Chromium lithium manganese oxide (Cr0-0.3Li0.9-1.4Mn1.7-2O4) 329689-77-2, Iron lithium manganese oxide (Fe0-0.3Li0.9-1.4Mn1.7-2O4) 329689-78-3, Cobalt lithium manganese oxide (Co0-0.3Li0.9-1.4Mn1.7-2O4) 329689-79-4, Aluminum lithium manganese oxide (Al0-0.3Li0.9-1.4Mn1.7-2O4) 329689-80-7, Lithium manganese nickel oxide (Li0.9-1.4Mn1.7-2Ni0-0.3O4) 329689-81-8, Lithium manganese oxide (Li1.01Mn2O4) 329689-86-3, Cobalt lithium manganese oxide (Co0.02Li1.02Mn1.98O4) 329689-87-4, Lithium manganese vanadium oxide (Li0.96Mn1.9V0.1O4) 329689-88-5, Iron lithium manganese oxide (Fe0.15LiMn1.85O4) 329689-89-6, Chromium lithium manganese oxide (Cr0.25Li1.1Mn1.75O4)  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte battery)

IT 7439-93-2, Lithium, uses 30604-81-0, Polypyrrole  
 RL: DEV (Device component use); MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (cathode active material for nonaq. electrolyte battery)

IT 7429-90-5, Aluminum, uses 24937-79-9, PvdF  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathode active material for nonaq. electrolyte battery)

IT 7440-44-0, Carbon, uses  
 RL: DEV (Device component use); MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (pyrocarbon; cathode active material for nonaq. electrolyte battery)

IT 130811-80-2, Lithium manganese nickel oxide (LiMn1.8Ni0.2O4) 329689-73-8, Lithium manganese titanium oxide (Li0.9-1.4Mn1.7-2Ti0-0.3O4) 329689-80-7, Lithium manganese nickel oxide (Li0.9-1.4Mn1.7-2Ni0-0.3O4)  
 RL: DEV (Device component use); USES (Uses)  
 (cathode active material for nonaq. electrolyte battery)

RN 130811-80-2 HCAPLUS  
 CN Lithium manganese nickel oxide (LiMn1.8Ni0.2O4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ni	0.2	7440-02-0

Mn	1.8	7439-96-5
Li	1	7439-93-2

RN 329689-73-8 HCAPLUS

CN Lithium manganese titanium oxide (Li<sub>0.9</sub>-1.4Mn<sub>1.7</sub>-2Ti<sub>0</sub>-0.3O<sub>4</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ti	0 - 0.3	7440-32-6
Mn	1.7 - 2	7439-96-5
Li	0.9 - 1.4	7439-93-2

RN 329689-80-7 HCAPLUS

CN Lithium manganese nickel oxide (Li<sub>0.9</sub>-1.4Mn<sub>1.7</sub>-2Ni<sub>0</sub>-0.3O<sub>4</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	4	17778-80-2
Ni	0 - 0.3	7440-02-0
Mn	1.7 - 2	7439-96-5
Li	0.9 - 1.4	7439-93-2

L76 ANSWER 15 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1999:557137 HCAPLUS

DN 131:172671

ED Entered STN: 02 Sep 1999

TI Secondary alkaline batteries

IN Katsumoto, Masumi; Akutsu, Norikatsu; Yao, Takefumi

PA Matsushita Electric Industrial Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0004-32

ICS H01M0004-62; H01M0010-30

CC 52-2' (Electrochemical, Radiational, and Thermal Energy  
Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 11238507	A2	19990831	JP 1998-39956	19980223

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PI JP 11238507 A2 19990831 JP 1998-39956

199802

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JP 3543601

B2

20040714

PRAI JP 1998-39956

19980223 &lt;--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11238507	ICM	H01M0004-32
	ICS	H01M0004-62; H01M0010-30
	IPCI	H01M0004-32 [ICM,6]; H01M0004-62 [ICS,6]; H01M0010-30 [ICS,6]
	IPCR	H01M0004-32 [I,A]; H01M0004-32 [I,C*]; H01M0004-52 [I,A]; H01M0004-52 [I,C*]; H01M0004-62 [I,A]; H01M0004-62 [I,C*]; H01M0010-24 [I,C*]; H01M0010-30 [I,A]

JP 11238507

ICM

H01M0004-32

ICS

H01M0004-62; H01M0010-30

IPCI

H01M0004-32 [ICM,6]; H01M0004-62 [ICS,6];  
H01M0010-30 [ICS,6]

IPCR

H01M0004-32 [I,A]; H01M0004-32 [I,C\*];  
H01M0004-52 [I,A]; H01M0004-52 [I,C\*];  
H01M0004-62 [I,A]; H01M0004-62 [I,C\*];  
H01M0010-24 [I,C\*]; H01M0010-30 [I,A]AB The batteries use Ni(OH)<sub>2</sub> powder mixed with Co Li oxide powder and  
Zn and/or Zn compds. as the cathode active mass filled in

a porous substrate. The Co Li oxide may also contain Na and/or K, and the Zn compound is ZnO or Zn(OH)<sub>2</sub>.

ST battery nickel hydroxide **cathode** additive; cobalt lithium oxide additive nickel hydroxide **cathode**; zinc compd additive nickel hydroxide **cathode**

IT Battery **cathodes**  
(**cathodes** from nickel hydroxide powder mixed with cobalt lithium oxide and zinc compds. for secondary alkaline batteries)

IT 12054-48-7, Nickel hydroxide [Ni(OH)<sub>2</sub>]  
RL: DEV (Device component use); USES (Uses)  
(**cathodes** from nickel hydroxide powder mixed with cobalt lithium oxide and zinc compds. for secondary alkaline batteries)

IT 52627-24-4, Cobalt lithium oxide 238397-89-2, Cobalt lithium sodium oxide  
RL: MOA (Modifier or additive use); USES (Uses)  
(**cathodes** from nickel hydroxide powder mixed with cobalt lithium oxide and zinc compds. for secondary alkaline batteries)

L76 ANSWER 16 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
AN 1999:498715 HCAPLUS  
DN 131:132285  
ED Entered STN: 11 Aug 1999  
TI **Cathode** active mass for secondary lithium batteries, its manufacture, and the batteries  
IN Ejima, Koichiro; Hiraoka, Yukio; Okabe, Katsuaki; Yamanaka, Yoshinori; Ogi, Kozo; Nishina, Masayuki  
PA Dowa Mining Co., Ltd., Japan  
SO Jpn. Kokai Tokkyo Koho, 10 pp.  
CODEN: JKXXAF  
DT Patent  
LA Japanese  
IC ICM H01M0004-58  
ICS C01G0053-00; H01M0004-02; H01M0010-40  
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 11219706	A2	19990810	JP 1998-33679	19980130

JP 3355126 B2 20021209  
PRAI JP 1998-33679 19980130 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11219706	ICM	H01M0004-58
	ICS	C01G0053-00; H01M0004-02; H01M0010-40
	IPCI	H01M0004-58 [ICM,6]; C01G0053-00 [ICS,6]; H01M0004-02 [ICS,6]; H01M0010-40 [ICS,6]
	IPCR	C01G0053-00 [I,A]; C01G0053-00 [I,C*]; H01M0004-02 [I,A]; H01M0004-02 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The **cathode** active mass is secondary particles of LiNi<sub>1-x-y</sub>CoxEyo<sub>2</sub> (E = Mn, Al, and/or Ti, 0.10 ≤ x ≤ 0.20, 0.02 ≤ y ≤ 0.10) primary particles bonded by inorg. oxide containing inorg. binder and has weight loss ≤ 0.5% on its DTA curve when heated to 750° in an inert atmospheric The binder is oxide of Li and ≥ 1 of Mg, Y, Zr, B, Co, and P. The active mass is prepared by sintering a mixture of source compds. of

required elements at a temp T = 500-800°, grinding the sinter in water to average particle diameter  $\leq 1 \mu m$ , spray drying the slurry to form spherical particles, and re-sinter the particles between T+30 and 900°.

ST battery **cathode** lithium nickel cobalt oxide manuf

IT 12057-24-8, Lithium oxide, miscellaneous

RL: MSC (Miscellaneous)

(binders in manufacture of inorg. oxide bonded secondary cobalt lithium nickel oxide particles for lithium battery **cathodes**)

IT 554-13-2, Lithium carbonate 1309-42-8, Magnesium hydroxide

7664-38-2, Phosphoric acid, uses 10043-35-3, Boric acid, uses

10141-05-6, Cobalt nitrate 10361-93-0, Yttrium nitrate

10377-60-3, Magnesium nitrate 13473-90-0, Aluminum nitrate

13746-89-9, Zirconium nitrate 21645-51-2, Aluminum hydroxide, uses

RL: NUU (Other use, unclassified); USES (Uses)

(binders in manufacture of inorg. oxide bonded secondary cobalt lithium nickel oxide particles for lithium battery **cathodes**)

IT 177997-13-6P, Aluminum cobalt lithium nickel oxide

186298-17-9P, Aluminum cobalt lithium manganese nickel oxide

233760-32-2P

RL: DEV (Device component use); IMF (Industrial manufacture); PRP (Properties); PREP (Preparation); USES (Uses)

(comps. and manufacture of inorg. oxide bonded secondary cobalt lithium nickel oxide particles for lithium battery **cathodes**)

IT 7697-37-2, Nitric acid, uses

RL: NUU (Other use, unclassified); USES (Uses)

(in manufacture of inorg. oxide bonded secondary cobalt lithium nickel oxide particles for lithium battery **cathodes**)

IT 177997-13-6P, Aluminum cobalt lithium nickel oxide

186298-17-9P, Aluminum cobalt lithium manganese nickel oxide

233760-32-2P

RL: DEV (Device component use); IMF (Industrial manufacture); PRP (Properties); PREP (Preparation); USES (Uses)

(comps. and manufacture of inorg. oxide bonded secondary cobalt lithium nickel oxide particles for lithium battery **cathodes**)

RN 177997-13-6 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Al	x	7429-90-5

RN 186298-17-9 HCAPLUS

CN Aluminum cobalt lithium manganese nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2
Al	x	7429-90-5

RN 233760-32-2 HCAPLUS



C01G0053-00 [I,C\*]; C01G0053-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-52 [I,C\*]; H01M0004-52 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 ECLA C01G051/00; C01G053/00; H01M004/48B2;  
 H01M004/52B2; H01M010/40L2  
 JP 11273677 IPCI H01M0004-58 [ICM,6]; H01M0004-02 [ICS,6];  
 H01M0010-40 [ICS,6]; H01M0010-36 [ICS,6,C\*]  
 IPCR C01G0051-00 [I,A]; C01G0051-00 [I,C\*];  
 C01G0053-00 [I,A]; C01G0053-00 [I,C\*];  
 H01M0004-48 [I,A]; H01M0004-48 [I,C\*];  
 H01M0004-52 [I,A]; H01M0004-52 [I,C\*];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 CA 2265372 IPCI H01M0004-52 [ICM,6]; H01M0010-24 [ICS,6];  
 H01M0004-32 [ICS,6]; H01M0004-34 [ICS,6];  
 H01M0004-50 [ICS,6]; H01M0004-54 [ICS,6];  
 H01M0004-48 [ICS,6,C\*]  
 IPCR H01M0004-58 [I,C\*]; H01M0004-58 [I,A];  
 C01G0051-00 [I,C\*]; C01G0051-00 [I,A];  
 C01G0053-00 [I,C\*]; C01G0053-00 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-48 [I,C\*]; H01M0004-48 [I,A];  
 H01M0004-52 [I,C\*]; H01M0004-52 [I,A];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 US 6333128 IPCI H01M0004-58 [ICM,7]; H01M0004-34 [ICS,7];  
 H01M0004-36 [ICS,7]; H01M0004-32 [ICS,7];  
 H01M0004-50 [ICS,7]  
 IPCR C01G0051-00 [I,A]; C01G0051-00 [I,C\*];  
 C01G0053-00 [I,A]; C01G0053-00 [I,C\*];  
 H01M0004-48 [I,A]; H01M0004-48 [I,C\*];  
 H01M0004-52 [I,A]; H01M0004-52 [I,C\*];  
 H01M0010-36 [I,C\*]; H01M0010-40 [I,A]  
 NCL 429/231.950; 429/218.100; 429/219.000;  
 429/222.000; 429/223.000; 429/224.000;  
 429/231.300; 429/231.600  
 ECLA C01G051/00; C01G053/00; H01M004/48B2;  
 H01M004/52B2; H01M010/40L2  
 AB A cathode material for a lithium secondary battery  
 comprises a composite oxide powder with median diameter  
 3.0-20.0  $\mu$  m containing  $\leq 10$  volume%  $\leq 1$ -  
 $\mu$ m particles, represented by the general formula  
 $\text{Li}(\text{aCo} + \text{bMn} + \text{cNi} + \text{d}(\text{B} + \text{Mg} + \text{Al} + \text{Si} + \text{Ca} + \text{Sc} + \text{Ti} + \text{V} + \text{Cr} + \text{Fe} + \text{Cu} + \text{Zn} + \text{Ga} + \text{Ge} + \text{Y} + \text{Nb} + \text{Mo} + \text{Ru} + \text{Rh} + \text{Pd} + \text{Ag} + \text{Cd} + \text{In} + \text{Sn}))\text{O}_2$ , where M is  $\geq 1$  of B, Mg, Al, Si, Ca, Sc,  
 Ti, V, Cr, Mn, Fe, Cu, Zn, Ga, Ge, Y, Nb, Mo, Ru, Rh, Pd, Ag, Cd, In  
 and Sn;  $0 \leq a \leq 1.2$ ;  $0.01 \leq b \leq 0.4$ ;  
 $0.01 \leq c \leq 0.4$ ; and  $0.02 \leq b + c \leq 0.5$ . The  
 lithium secondary battery exhibits improved charge-discharge cycle  
 characteristics.  
 ST composite oxide cathode lithium secondary battery  
 IT Battery cathodes  
 (composite oxide cathode material for lithium secondary  
 battery)  
 IT Secondary batteries  
 (lithium; composite oxide cathode material for lithium  
 secondary battery)  
 IT 120062-99-9, Cobalt copper lithium nickel oxide  
 177997-11-4, Cobalt gallium lithium nickel oxide 177997  
 -12-5, Boron cobalt lithium nickel oxide 177997-13-6,  
 Aluminum cobalt lithium nickel oxide 177997-14-7, Cobalt  
 indium lithium nickel oxide 177997-15-8, Cobalt lithium  
 nickel tin oxide 180997-14-2, Cobalt lithium magnesium  
 nickel oxide 182442-94-0, Cobalt lithium nickel vanadium  
 oxide 182442-95-1, Cobalt lithium manganese nickel oxide  
 182442-96-2, Cobalt iron lithium nickel oxide  
 182442-97-3, Cobalt lithium nickel zinc oxide  
 191024-83-6, Cobalt lithium manganese nickel oxide

(Co<sub>0.4</sub>LiMn<sub>0.1</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 193215-05-3, Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.2</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 193215-53-1, Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.3</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 193215-92-8, Cobalt lithium manganese nickel oxide (Co<sub>0.1</sub>LiMn<sub>0.4</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 210353-05-2, Calcium cobalt lithium nickel oxide 223923-05-5, Cobalt lithium manganese nickel oxide (Co<sub>0.3</sub>LiMn<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 244304-18-5, Cobalt lithium nickel silicon oxide 244304-19-6, Cobalt lithium nickel scandium oxide 244304-20-9, Cobalt lithium nickel titanium oxide 244304-21-0, Chromium cobalt lithium nickel oxide 244304-22-1, Cobalt germanium lithium nickel oxide 244304-23-2, Cobalt lithium nickel yttrium oxide 244304-24-3, Cobalt lithium nickel niobium oxide 244304-25-4, Cobalt lithium molybdenum nickel oxide 244304-26-5, Cobalt lithium nickel ruthenium oxide 244304-27-6, Cobalt lithium nickel rhodium oxide 244304-28-7, Cobalt lithium nickel palladium oxide 244304-29-8, Cobalt lithium nickel silver oxide 244304-30-1, Cadmium cobalt lithium nickel oxide 244304-31-2, Cobalt lithium manganese nickel oxide (Co<sub>0.01</sub>LiMn<sub>0.01</sub>Ni<sub>0.98</sub>O<sub>2</sub>) 244304-32-3, Cobalt lithium manganese nickel oxide (Co<sub>0.01</sub>LiMn<sub>0.2</sub>Ni<sub>0.79</sub>O<sub>2</sub>) 244304-33-4, Cobalt lithium manganese nickel oxide (Co<sub>0.01</sub>LiMn<sub>0.4</sub>Ni<sub>0.59</sub>O<sub>2</sub>) 244304-34-5, Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.01</sub>Ni<sub>0.79</sub>O<sub>2</sub>) 244304-35-6, Cobalt lithium manganese nickel oxide (Co<sub>0.4</sub>LiMn<sub>0.01</sub>Ni<sub>0.59</sub>O<sub>2</sub>) 244304-36-7, Cobalt lithium nickel borate oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>(BO<sub>3</sub>)<sub>0.1</sub>O<sub>1.7</sub>) 244304-37-8, Cobalt lithium magnesium nickel oxide (Co<sub>0.3</sub>LiMg<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 244304-38-9, Aluminum cobalt lithium nickel oxide (Al<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-39-0, Cobalt lithium nickel scandium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sc<sub>0.1</sub>O<sub>2</sub>) 244304-40-3, Calcium cobalt lithium nickel oxide (Ca<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-42-5, Cobalt lithium nickel titanium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ti<sub>0.1</sub>O<sub>2</sub>) 244304-43-6, Cobalt lithium nickel vanadium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>V<sub>0.1</sub>O<sub>2</sub>) 244304-44-7, Chromium cobalt lithium nickel oxide (Cr<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-45-8, Cobalt iron lithium nickel oxide (Co<sub>0.3</sub>Fe<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-46-9, Cobalt copper lithium nickel oxide (Co<sub>0.3</sub>Cu<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-47-0, Cobalt lithium nickel zinc oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Zn<sub>0.1</sub>O<sub>2</sub>) 244304-48-1, Cobalt gallium lithium nickel oxide (Co<sub>0.3</sub>Ga<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-49-2, Cobalt germanium lithium nickel oxide (Co<sub>0.3</sub>Ge<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-50-5, Cobalt lithium nickel yttrium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Y<sub>0.1</sub>O<sub>2</sub>) 244304-51-6, Cobalt lithium nickel niobium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Nb<sub>0.1</sub>O<sub>2</sub>) 244304-52-7, Cobalt lithium molybdenum nickel oxide (Co<sub>0.3</sub>LiMo<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 244304-53-8, Cobalt lithium nickel ruthenium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ru<sub>0.1</sub>O<sub>2</sub>) 244304-54-9, Cobalt lithium nickel rhodium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Rh<sub>0.1</sub>O<sub>2</sub>) 244304-55-0, Cobalt lithium nickel palladium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Pd<sub>0.1</sub>O<sub>2</sub>) 244304-56-1, Cobalt lithium nickel silver oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ag<sub>0.1</sub>O<sub>2</sub>) 244304-57-2, Cadmium cobalt lithium nickel oxide (Cd<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-58-3, Cobalt indium lithium nickel oxide (Co<sub>0.3</sub>In<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-59-4, Cobalt lithium nickel tin oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sn<sub>0.1</sub>O<sub>2</sub>)

RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(composite oxide cathode material for lithium secondary battery)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE

- (1) Fuji Chem Ind Co Ltd; EP 0806397 A 1997 HCAPLUS
- (2) Japan Storage Battery Co Ltd; JP 11054120 A 1999 HCAPLUS
- (3) Masami, U; WO 9806670 A 1998 HCAPLUS

- (4) Mayer, S; US 5783333 A 1998 HCAPLUS
- (5) Sakai Chem Ind Co Ltd; JP 10059725 A 1998 HCAPLUS
- (6) Sanyo Electric Co; EP 0872450 A 1998 HCAPLUS
- (7) Sanyo Electric Co Ltd; JP 10188982 A 1998 HCAPLUS
- (8) Sony Corp; JP 11007958 A 1999 HCAPLUS
- IT 120062-99-9, Cobalt copper lithium nickel oxide
- 177997-11-4, Cobalt gallium lithium nickel oxide
- 177997-12-5, Boron cobalt lithium nickel oxide
- 177997-13-6, Aluminum cobalt lithium nickel oxide
- 177997-14-7, Cobalt indium lithium nickel oxide
- 177997-15-8, Cobalt lithium nickel tin oxide
- 180997-14-2, Cobalt lithium magnesium nickel oxide
- 182442-94-0, Cobalt lithium nickel vanadium oxide
- 182442-95-1, Cobalt lithium manganese nickel oxide
- 182442-96-2, Cobalt iron lithium nickel oxide
- 182442-97-3, Cobalt lithium nickel zinc oxide
- 191024-83-6, Cobalt lithium manganese nickel oxide  
(Co<sub>0.4</sub>LiMn<sub>0.1</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 193215-05-3, Cobalt lithium  
manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.2</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 193215-53-1,  
Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.3</sub>Ni<sub>0.5</sub>O<sub>2</sub>)  
193215-92-8, Cobalt lithium manganese nickel oxide  
(Co<sub>0.1</sub>LiMn<sub>0.4</sub>Ni<sub>0.5</sub>O<sub>2</sub>) 210353-05-2, Calcium cobalt lithium  
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244304-22-1, Cobalt germanium lithium nickel oxide  
244304-23-2, Cobalt lithium nickel yttrium oxide  
244304-24-3, Cobalt lithium nickel niobium oxide  
244304-25-4, Cobalt lithium molybdenum nickel oxide  
244304-26-5, Cobalt lithium nickel ruthenium oxide  
244304-27-6, Cobalt lithium nickel rhodium oxide  
244304-28-7, Cobalt lithium nickel palladium oxide  
244304-29-8, Cobalt lithium nickel silver oxide  
244304-30-1, Cadmium cobalt lithium nickel oxide  
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, Cobalt lithium nickel borate oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>(BO<sub>3</sub>)<sub>0.101.7</sub>)  
244304-37-8, Cobalt lithium magnesium nickel oxide  
(Co<sub>0.3</sub>LiMg<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) 244304-38-9, Aluminum cobalt lithium  
nickel oxide (Al<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-39-0, Cobalt  
lithium nickel scandium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sc<sub>0.102</sub>)  
244304-40-3, Calcium cobalt lithium nickel oxide  
(Ca<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-42-5, Cobalt lithium nickel  
titanium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ti<sub>0.102</sub>) 244304-43-6, Cobalt  
lithium nickel vanadium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>V<sub>0.102</sub>)  
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244304-47-0, Cobalt lithium nickel zinc oxide  
(Co<sub>0.3</sub>LiNi<sub>0.6</sub>Zn<sub>0.102</sub>) 244304-48-1, Cobalt gallium lithium  
nickel oxide (Co<sub>0.3</sub>Ga<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) 244304-49-2, Cobalt  
germanium lithium nickel oxide (Co<sub>0.3</sub>Ge<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>)  
244304-50-5, Cobalt lithium nickel yttrium oxide  
(Co<sub>0.3</sub>LiNi<sub>0.6</sub>Y<sub>0.102</sub>) 244304-51-6, Cobalt lithium nickel  
niobium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Nb<sub>0.102</sub>) 244304-52-7, Cobalt  
lithium molybdenum nickel oxide (Co<sub>0.3</sub>LiMo<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>)  
244304-53-8, Cobalt lithium nickel ruthenium oxide  
(Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ru<sub>0.102</sub>) 244304-54-9, Cobalt lithium nickel



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 indium lithium nickel oxide (Co<sub>0.3</sub>In<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>)  
 244304-59-4, Cobalt lithium nickel tin oxide  
 (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sn<sub>0.1</sub>O<sub>2</sub>)

RL: DEV (Device component use); TEM (Technical or engineered  
 material use); USES (Uses)

(composite oxide **cathode** material for lithium secondary  
 battery)

RN 120062-99-9 HCAPLUS

CN Cobalt copper lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Cu	x	7440-50-8
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-11-4 HCAPLUS

CN Cobalt gallium lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Ga	x	7440-55-3
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-12-5 HCAPLUS

CN Boron cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
B	x	7440-42-8
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-13-6 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Al	x	7429-90-5

RN 177997-14-7 HCAPLUS

CN Cobalt indium lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====

O	x	17778-80-2
In	x	7440-74-6
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 177997-15-8 HCAPLUS

CN Cobalt lithium nickel tin oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Sn	x	7440-31-5
Ni	x	7440-02-0
Li	x	7439-93-2

RN 180997-14-2 HCAPLUS

CN Cobalt lithium magnesium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mg	x	7439-95-4
Li	x	7439-93-2

RN 182442-94-0 HCAPLUS

CN Cobalt lithium nickel vanadium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
V	x	7440-62-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 182442-95-1 HCAPLUS

CN Cobalt lithium manganese nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mn	x	7439-96-5
Li	x	7439-93-2

RN 182442-96-2 HCAPLUS

CN Cobalt iron lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2
Fe	x	7439-89-6

RN 182442-97-3 HCAPLUS

CN Cobalt lithium nickel zinc oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
Zn	x	7440-66-6
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 191024-83-6 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.4</sub>LiMn<sub>0.1</sub>Ni<sub>0.5</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.4	7440-48-4
Ni	0.5	7440-02-0
Mn	0.1	7439-96-5
Li	1	7439-93-2

RN 193215-05-3 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.2</sub>Ni<sub>0.6</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.6	7440-02-0
Mn	0.2	7439-96-5
Li	1	7439-93-2

RN 193215-53-1 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.3</sub>Ni<sub>0.5</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.5	7440-02-0
Mn	0.3	7439-96-5
Li	1	7439-93-2

RN 193215-92-8 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.1</sub>LiMn<sub>0.4</sub>Ni<sub>0.5</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.1	7440-48-4
Ni	0.5	7440-02-0
Mn	0.4	7439-96-5
Li	1	7439-93-2

RN 210353-05-2 HCAPLUS

CN Calcium cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Ca	x	7440-70-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 223923-05-5 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.3</sub>LiMn<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Mn	0.1	7439-96-5
Li	1	7439-93-2

RN 244304-18-5 HCAPLUS

CN Cobalt lithium nickel silicon oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Si	x	7440-21-3
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-19-6 HCAPLUS

CN Cobalt lithium nickel scandium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Sc	x	7440-20-2
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-20-9 HCAPLUS

CN Cobalt lithium nickel titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ti	x	7440-32-6
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-21-0 HCAPLUS

CN Chromium cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2

Co	x	7440-48-4
Cr	x	7440-47-3
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-22-1 HCAPLUS

CN Cobalt germanium lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Ge	x	7440-56-4
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-23-2 HCAPLUS

CN Cobalt lithium nickel yttrium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Y	x	7440-65-5
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-24-3 HCAPLUS

CN Cobalt lithium nickel niobium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Co	x	7440-48-4
Nb	x	7440-03-1
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-25-4 HCAPLUS

CN Cobalt lithium molybdenum nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Mo	x	7439-98-7
Li	x	7439-93-2

RN 244304-26-5 HCAPLUS

CN Cobalt lithium nickel ruthenium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
O	x	17778-80-2
Co	x	7440-48-4
Ru	x	7440-18-8
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-27-6 HCAPLUS

CN Cobalt lithium nickel rhodium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Rh	x	7440-16-6
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-28-7 HCAPLUS

CN Cobalt lithium nickel palladium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Pd	x	7440-05-3
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-29-8 HCAPLUS

CN Cobalt lithium nickel silver oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ag	x	7440-22-4
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-30-1 HCAPLUS

CN Cadmium cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Cd	x	7440-43-9
Ni	x	7440-02-0
Li	x	7439-93-2

RN 244304-31-2 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.01LiMn0.01Ni0.98O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.01	7440-48-4
Ni	0.98	7440-02-0
Mn	0.01	7439-96-5
Li	1	7439-93-2

RN 244304-32-3 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co0.01LiMn0.2Ni0.79O2) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
-----------	-------	------------------------------

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.01	7440-48-4
Ni	0.79	7440-02-0
Mn	0.2	7439-96-5
Li	1	7439-93-2

RN 244304-33-4 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.01</sub>LiMn<sub>0.4</sub>Ni<sub>0.59</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.01	7440-48-4
Ni	0.59	7440-02-0
Mn	0.4	7439-96-5
Li	1	7439-93-2

RN 244304-34-5 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.2</sub>LiMn<sub>0.01</sub>Ni<sub>0.79</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.2	7440-48-4
Ni	0.79	7440-02-0
Mn	0.01	7439-96-5
Li	1	7439-93-2

RN 244304-35-6 HCAPLUS

CN Cobalt lithium manganese nickel oxide (Co<sub>0.4</sub>LiMn<sub>0.01</sub>Ni<sub>0.59</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.4	7440-48-4
Ni	0.59	7440-02-0
Mn	0.01	7439-96-5
Li	1	7439-93-2

RN 244304-36-7 HCAPLUS

CN Cobalt lithium nickel borate oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>(BO<sub>3</sub>)<sub>0.1</sub>O<sub>1.7</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.7	17778-80-2
BO <sub>3</sub>	0.1	14213-97-9
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-37-8 HCAPLUS

CN Cobalt lithium magnesium nickel oxide (Co<sub>0.3</sub>LiMg<sub>0.1</sub>Ni<sub>0.60</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
-----------	-------	---------------------------

O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Mg	0.1	7439-95-4
Li	1	7439-93-2

RN 244304-38-9 HCAPLUS

CN Aluminum cobalt lithium nickel oxide (Al<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2
Al	0.1	7429-90-5

RN 244304-39-0 HCAPLUS

CN Cobalt lithium nickel scandium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sc<sub>0.1</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Sc	0.1	7440-20-2
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-40-3 HCAPLUS

CN Calcium cobalt lithium nickel oxide (Ca<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ca	0.1	7440-70-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-42-5 HCAPLUS

CN Cobalt lithium nickel titanium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ti<sub>0.1</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Ti	0.1	7440-32-6
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-43-6 HCAPLUS

CN Cobalt lithium nickel vanadium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>V<sub>0.1</sub>O<sub>2</sub>) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2



V	0.1	7440-62-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-44-7 HCAPLUS

CN Chromium cobalt lithium nickel oxide (Cr0.1Co0.3LiNi0.6O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Cr	0.1	7440-47-3
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-45-8 HCAPLUS

CN Cobalt iron lithium nickel oxide (Co0.3Fe0.1LiNi0.6O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2
Fe	0.1	7439-89-6

RN 244304-46-9 HCAPLUS

CN Cobalt copper lithium nickel oxide (Co0.3Cu0.1LiNi0.6O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Cu	0.1	7440-50-8
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-47-0 HCAPLUS

CN Cobalt lithium nickel zinc oxide (Co0.3LiNi0.6Zn0.1O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Zn	0.1	7440-66-6
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-48-1 HCAPLUS

CN Cobalt gallium lithium nickel oxide (Co0.3Ga0.1LiNi0.6O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Ga	0.1	7440-55-3

Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-49-2 HCAPLUS

CN Cobalt germanium lithium nickel oxide (Co<sub>0.3</sub>Ge<sub>0.1</sub>LiNi<sub>0.6</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Ge	0.1	7440-56-4
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-50-5 HCAPLUS

CN Cobalt lithium nickel yttrium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Y<sub>0.1</sub>O<sub>2</sub>) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Y	0.1	7440-65-5
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-51-6 HCAPLUS

CN Cobalt lithium nickel niobium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Nb<sub>0.1</sub>O<sub>2</sub>) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Nb	0.1	7440-03-1
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-52-7 HCAPLUS

CN Cobalt lithium molybdenum nickel oxide (Co<sub>0.3</sub>LiMo<sub>0.1</sub>Ni<sub>0.6</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Ni	0.6	7440-02-0
Mo	0.1	7439-98-7
Li	1	7439-93-2

RN 244304-53-8 HCAPLUS

CN Cobalt lithium nickel ruthenium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ru<sub>0.1</sub>O<sub>2</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Ru	0.1	7440-18-8

Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-54-9 HCAPLUS

CN Cobalt lithium nickel rhodium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Rh<sub>0.102</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Rh	0.1	7440-16-6
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-55-0 HCAPLUS

CN Cobalt lithium nickel palladium oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Pd<sub>0.102</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Pd	0.1	7440-05-3
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-56-1 HCAPLUS

CN Cobalt lithium nickel silver oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Ag<sub>0.102</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Ag	0.1	7440-22-4
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-57-2 HCAPLUS

CN Cadmium cobalt lithium nickel oxide (Cd<sub>0.1</sub>Co<sub>0.3</sub>LiNi<sub>0.602</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.3	7440-48-4
Cd	0.1	7440-43-9
Ni	0.6	7440-02-0
Li	1	7439-93-2

RN 244304-58-3 HCAPLUS

CN Cobalt indium lithium nickel oxide (Co<sub>0.3</sub>In<sub>0.1</sub>LiNi<sub>0.602</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
In	0.1	7440-74-6
Co	0.3	7440-48-4
Ni	0.6	7440-02-0

Li | 1 | 7439-93-2

RN 244304-59-4 HCAPLUS

CN Cobalt lithium nickel tin oxide (Co<sub>0.3</sub>LiNi<sub>0.6</sub>Sn<sub>0.102</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.3	7440-48-4
Sn	0.1	7440-31-5
Ni	0.6	7440-02-0
Li	1	7439-93-2

L76 ANSWER 18 OF 29 JAPIO (C) 2006 JPO on STN

AN 1999-016572 JAPIO

TI POSITIVE **ELECTRODE** MATERIAL FOR LITHIUM SECONDARY BATTERY,  
AND PREPARATION OF PRECURSOR COMPOSITION THEREOF

IN TAKEYA KANAME; KUBO SHIGEKI

PA SUMITOMO METAL MINING CO LTD

PI JP 11016572 A 19990122 Heisei

AI JP 1997-166797 (JP09166797 Heisei) 19970624

PRAI JP 1997-166797 19970624

SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol.  
1999

IC ICM H01M0004-58

ICS C01G0053-00; H01M0004-02; H01M0004-04; H01M0010-40

AB PROBLEM TO BE SOLVED: To provide a preparation method for a positive  
**electrode** material for a lithium **secondary** battery  
comprising a **compound oxide** of Li and

Ni containing Al of homogeneous solid-solution condition,  
and having a layer crystal structure of excellent thermal stability,  
and provide a preparation method for a precursor composition with  
homogeneously dispersed Al used therefor.

SOLUTION: A nickel salt is suspended in water, an alkali salt of an  
aluminic acid is dissolved in it, and the alkali salt of the aluminic  
acid is neutralized to deposit an aluminum hydroxide. After a  
mixture of the deposited aluminum hydroxide and the **nickel**  
salt is dried, a **lithium** salt is added and mixed to  
prepare a precursor composition 1. The precursor composition is  
baked in the atmosphere of air containing 1 volume% or more of ozone,  
or oxygen to prepare a positive **electrode** material.

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L76 ANSWER 19 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1996:76487 HCAPLUS

DN 124:122056

ED Entered STN: 06 Feb 1996

TI Lithium secondary battery having improved charge-discharge  
characteristic and safety

IN Kubota, Tadahiko; Tanaka, Mitsutoshi

PA Fuji Photo Film Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0010-40

ICS H01M0002-16; H01M0004-02; H01M0004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 07263028 A2 19951013 JP 1994-55614 199403  
25

US 5654114 A 19970805 US 1995-409045 199503  
23

PRAI JP 1994-55614 A 19940325 <--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 07263028	ICM	H01M0010-40
	ICS	H01M0002-16; H01M0004-02; H01M0004-58
	IPCI	H01M0010-40 [ICM,6]; H01M0002-16 [ICS,6]; H01M0004-02 [ICS,6]; H01M0004-58 [ICS,6]
US 5654114	IPCI	H01M0004-48 [ICM,6]; H01M0004-52 [ICS,6]
	IPCR	H01M0004-48 [I,A]; H01M0004-48 [I,C*]; H01M0004-52 [I,A]; H01M0004-52 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	NCL	429/338.000; 429/094.000; 429/231.300
AB	In a Li secondary battery, a neg. <b>electrode</b> active mass is an oxide containing $\geq 1$ of a Group IVA element, a Group VA element, In, Zn, and Mg, and a pos. <b>electrode</b> active mass is $\text{Li}_x\text{Co}_y\text{M}_z\text{O}_w$ , where M is Ni, V, Fe, Mn, Ti, or Cu; $y_1 = 0.75-1.0$ ; $y_2 = 0-0.25$ ; $y_1 + y_2 = 1$ ; $x = 0.7-1.2$ , and $z = 1.5-3.0$ . In the pos. <b>electrode</b> active mass, the average diam of particles D is $3 < D \leq 9.0 \mu\text{m}$ , and the volume ratio of particles having a diameter of $3-150 \mu\text{m}$ is $\geq 75\%$ . The preferred pos. <b>electrode</b> active mass contains Sn oxides. The battery has improved charge-discharge characteristic and safety.	
ST	lithium secondary battery safety	
IT	Safety (lithium secondary battery having improved charge-discharge characteristic and safety)	
IT	Batteries, secondary (lithium, having improved charge-discharge characteristic and safety)	
IT	1304-76-3, Bismuth oxide ( $\text{Bi}_2\text{O}_3$ ), uses 1309-60-0, Lead oxide ( $\text{PbO}_2$ ) 1309-64-4, Antimony oxide ( $\text{Sb}_2\text{O}_3$ ), uses 1310-53-8, Germanium oxide ( $\text{GeO}_2$ ), uses 1314-41-6, Lead oxide ( $\text{Pb}_3\text{O}_4$ ) 1317-36-8, Lead oxide ( $\text{PbO}$ ), uses 1332-81-6, Antimony oxide ( $\text{Sb}_2\text{O}_4$ ) 12055-92-4, Indium lithium oxide ( $\text{InLi}_3\text{O}_3$ ) 12188-25-9, Lithium tin oxide ( $\text{Li}_2\text{SnO}_3$ ) 12315-28-5, Germanium Lithium oxide ( $\text{GeLi}_2\text{O}_3$ ) 12344-15-9, Lithium tin oxide ( $\text{Li}_8\text{SnO}_6$ ) 12399-16-5, Lithium tin zinc oxide ( $\text{Li}_2\text{Sn}_2\text{ZnO}_6$ ) 15593-40-5, Antimony lithium oxide ( $\text{SbLi}_3\text{O}_4$ ) 15773-66-7, Tin silicate ( $\text{SnSiO}_3$ ) 18282-10-5, Tin oxide ( $\text{SnO}_2$ ) 20619-16-3, Germanium oxide ( $\text{GeO}$ ) 21651-19-4, Tin oxide ( $\text{SnO}$ ) 37356-04-0, Lithium zinc oxide ( $\text{Li}_2\text{ZnO}_2$ ) 53570-15-3 55128-56-8, Lithium tin oxide ( $\text{Li}_6\text{SnO}_5$ ) 167994-75-4, Lithium tin oxide ( $\text{Li}_{0.1}\text{SnO}_{2.05}$ ) 167994-88-9, Bismuth lithium oxide ( $\text{BiLi}_3\text{O}_4$ ) 170232-57-2, Lithium tin oxide ( $\text{Li}_{0.5}\text{SnO}_{2.25}$ ) 170232-58-3, Lithium tin oxide ( $\text{Li}_4\text{SnO}_4$ ) 170232-60-7, Lithium tin oxide ( $\text{Li}_{0.1}\text{SnO}_{1.05}$ ) 170232-61-8, Lithium tin oxide ( $\text{Li}_{0.5}\text{SnO}_{1.25}$ ) 170232-62-9, Lithium tin oxide ( $\text{Li}_8\text{SnO}_5$ ) 170232-64-1, Lithium tin oxide ( $\text{Li}_8\text{SnO}_5$ ) 172972-03-1, Lithium tin oxide ( $\text{Li}_2\text{SnO}_2$ ) RL: DEV (Device component use); USES (Uses) (neg. <b>electrode</b> active mass, in lithium secondary battery having improved charge-discharge characteristic and safety)	
IT	12190-79-3, Cobalt lithium oxide ( $\text{LiCoO}_2$ ) 173049-91-7, Cobalt lithium oxide ( $\text{CoLi}_{0.97}\text{O}_{1.7-2.3}$ ) 173049-92-8, Cobalt lithium nickel oxide ( $\text{Co}_{0.9}\text{Li}_{0.1}\text{O}_{1.7-2.3}$ ) 173049-93-9, Cobalt lithium vanadium oxide ( $\text{Co}_{0.95}\text{Li}_{0.05}\text{O}_{1.7-2.3}$ ) 173049-94-0, Cobalt lithium vanadium oxide ( $\text{Co}_{0.98}\text{Li}_{0.02}\text{O}_{1.7-2.3}$ ) 173049-95-1, Cobalt	

iron lithium oxide (Co0.75Fe0.25Li0.7-2.3) 173049-96-2, Cobalt  
lithium manganese oxide (Co0.75LiMn0.25O1.7-2.3) 173049-97-3,  
Cobalt lithium manganese oxide (Co0.85LiMn0.15O1.7-2.3)  
173049-98-4, Cobalt lithium manganese oxide (Co0.95LiMn0.05O1.7-2.3)  
173049-99-5, Cobalt lithium manganese oxide (Co0.97Li1.02Mn0.03O1.7-  
2.3) 173050-00-5, Cobalt lithium titanium oxide  
(Co0.97LiTi0.03O1.7-2.3) 173050-01-6, Cobalt copper lithium oxide  
(Co0.97Cu0.03LiO1.7-2.3)

RL: DEV (Device component use); USES (Uses)  
(pos. **electrode** active mass, in lithium secondary  
battery having improved charge-discharge characteristic and  
safety)

IT 173049-92-8, Cobalt lithium nickel oxide  
(Co0.9LiNi0.1O1.7-2.3) 173050-00-5, Cobalt lithium  
titanium oxide (Co0.97LiTi0.03O1.7-2.3)

RL: DEV (Device component use); USES (Uses)  
(pos. **electrode** active mass, in lithium secondary  
battery having improved charge-discharge characteristic and  
safety)

RN 173049-92-8 HCAPLUS

CN Cobalt lithium nickel oxide (Co0.9LiNi0.1O1.7-2.3) (9CI) (CA INDEX  
NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.7 - 2.3	17778-80-2
Co	0.9	7440-48-4
Ni	0.1	7440-02-0
Li	1	7439-93-2

RN 173050-00-5 HCAPLUS

CN Cobalt lithium titanium oxide (Co0.97LiTi0.03O1.7-2.3) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	1.7 - 2.3	17778-80-2
Co	0.97	7440-48-4
Ti	0.03	7440-32-6
Li	1	7439-93-2

L76 ANSWER 20 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1995:773114 HCAPLUS

DN 123:261729

ED Entered STN: 02 Sep 1995

TI Lithium secondary battery having long service life

IN Inamasu, Tokuo

PA Yuasa Battery Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0010-40

ICS H01M0004-02; H01M0004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 07142093	A2	19950602	JP 1993-291083	

199311

22

PRAI JP 1993-291083

19931122 &lt;--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 07142093	ICM	H01M0010-40
	ICS	H01M0004-02; H01M0004-58
	IPCI	H01M0010-40 [ICM,6]; H01M0010-36 [ICM,6,C*]; H01M0004-02 [ICS,6]; H01M0004-58 [ICS,6]

AB A cathode active mass of the title battery is LiMxOy (M = Co, Ni, Mn, Fe) with layered- or spinel structure and has pH ≤10. The battery shows high discharge capacity and long life.

ST battery cathode lithium compd oxide

IT Cathodes  
(battery, lithium secondary batteries with lithium compound oxide cathodes having controlled pH)

IT 12016-89-6P, Cobalt lithium manganese oxide 39300-70-4P, Lithium nickel oxide 39457-42-6P, Lithium manganese oxide 52627-24-4P, Lithium cobalt oxide 152654-50-7P, Cobalt iron lithium oxide

RL: DEV (Device component use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)  
(lithium secondary batteries with lithium compound oxide cathodes having controlled pH)

L76 ANSWER 21 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1995:719362 HCAPLUS

DN 123:88460

ED Entered STN: 04 Aug 1995

TI Non-aqueous secondary batteries

IN Kubota, Tadahiko

PA Fuji Photo Film Co Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0004-04

ICS H01M0004-02; H01M0004-58; H01M0006-14; H01M0010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 07114915	A2	19950502	JP 1993-280699	19931015

PRAI JP 1993-280699

19931015 &lt;--

## CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 07114915	ICM	H01M0004-04
	ICS	H01M0004-02; H01M0004-58; H01M0006-14; H01M0010-40
	IPCI	H01M0004-04 [ICM,6]; H01M0004-02 [ICS,6]; H01M0004-58 [ICS,6]; H01M0006-14 [ICS,6]; H01M0010-40 [ICS,6]; H01M0010-36 [ICS,6,C*]

AB The batteries consists of a non-aqueous electrolyte solution, a neg. electrode containing an active material capable of absorbing or releasing light metals or their alloy, or Li ions, and a pos. electrode containing an active material prepared heating at 450-800° for 3-100 h and then at a temperature 50-600° higher than that at the first time, and cooling at

0.1-25°/min. The prepared pos. active material is pulverized to average 10-80  $\mu$  m with  $\geq 75\%$  particles having a diameter 3-15  $\mu$  m, and has a sp. surface area 1-10 m<sup>2</sup>/g. The pos. active material is:  $\text{Li}_x\text{M}_{y1}\text{N}_{y2}\text{O}_z$ , where M = Co or Ni, N = Ni, V, Fe, Mn, Ti or Cu,  $y_1 = 0.6-1.0$ ,  $y_2 \leq 0.4$  ( $y_1 + y_2 = 1$ ),  $x = 0.8-1.0$ , and  $z = 1.5-3.0$ . The manufactured batteries show good self-discharge behavior.

ST pos active material nonaq battery  
 IT Batteries, secondary  
 (non-aqueous batteries with improved self-discharge behavior)  
 IT 12016-89-6, Cobalt lithium manganese oxide 52627-24-4, Cobalt lithium oxide 116713-67-8, Cobalt lithium titanium oxide 120479-28-9, Cobalt copper lithium oxide 131344-56-4, Cobalt lithium nickel oxide 146956-50-5, Cobalt lithium vanadium oxide 152654-50-7, Cobalt iron lithium oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (pos. active material; non-aqueous batteries with improved self-discharge behavior)  
 IT 116713-67-8, Cobalt lithium titanium oxide 131344-56-4, Cobalt lithium nickel oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (pos. active material; non-aqueous batteries with improved self-discharge behavior)  
 RN 116713-67-8 HCAPLUS  
 CN Cobalt lithium titanium oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ti	x	7440-32-6
Li	x	7439-93-2

RN 131344-56-4 HCAPLUS  
 CN Cobalt lithium nickel oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	x	17778-80-2
Co	x	7440-48-4
Ni	x	7440-02-0
Li	x	7439-93-2

L76 ANSWER 22 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
 AN 1995:503065 HCAPLUS  
 DN 122:244107  
 ED Entered STN: 22 Apr 1995  
 TI Complex oxide cathode active mass having specific shape for lithium secondary battery  
 IN Nakai, Kenji; Higashimoto, Koji; Hironaka, Kensuke; Hayakawa, Takumi; Komaki, Akio; Takashima, Masayuki; Ogiwara, Takashi; Yonezawa, Susumu; Tanaka, Tamotsu; et al.  
 PA Shin Kobe Electric Machinery, Japan; Tanaka Kagaku Kenkyusho Kk  
 SO Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0004-58  
 ICS H01M0004-02; H01M0010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 06333562 A2 19941202 JP 1993-117524 199305  
20

JP 3276451 B2 20020422  
PRAI JP 1993-117524 19930520 <--  
CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06333562	ICM	H01M0004-58
	ICS	H01M0004-02; H01M0010-40
	IPCI	H01M0004-58 [ICM,5]; H01M0004-02 [ICS,5]; H01M0010-40 [ICS,5]; H01M0010-36 [ICS,5,C*]

AB **Cathode** active mass in a Li secondary battery is  $\text{Li}_x\text{MyO}_2$  (M = Co, Ni, Mn, V, Fe, or Ti, x = 0.2-2, and y = 0.8-1.25). The particles of the **cathode** active mass have spherical form with uniformly distributed surface depressions and protrusions. The particles have **diameter** 0.1-1.1  $\mu\text{m}$  with median **diameter** being 0.5-0.6  $\mu\text{m}$ . The battery has increased charge and discharge capacity.

ST **cathode** lithium secondary battery

IT **Cathodes**  
(battery, complex oxide **cathode** active mass having specific shape for lithium secondary battery)

IT 12190-79-3, Cobalt lithium oxide ( $\text{LiCoO}_2$ ) 162456-53-3, Cobalt lithium oxide ( $\text{Co}_{0.8-1.25}\text{Li}_{0.2-2}\text{O}_2$ ) 162456-54-4, Lithium nickel oxide ( $\text{Li}_{0.2-2}\text{Ni}_{0.8-1.25}\text{O}_2$ ) 162456-55-5, Lithium manganese oxide ( $\text{Li}_{0.2-2}\text{Mn}_{0.8-1.25}\text{O}_2$ ) 162456-56-6, Iron lithium oxide ( $\text{Fe}_{0.8-1.25}\text{Li}_{0.2-2}\text{O}_2$ ) 162456-57-7, Lithium vanadium oxide ( $\text{Li}_{0.2-2}\text{V}_{0.8-1.25}\text{O}_2$ ) 162456-58-8, Lithium titanium oxide ( $\text{Li}_{0.2-2}\text{Ti}_{0.8-1.25}\text{O}_2$ )  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(complex oxide **cathode** active mass having specific shape for lithium secondary battery)

IT 162456-54-4, Lithium nickel oxide ( $\text{Li}_{0.2-2}\text{Ni}_{0.8-1.25}\text{O}_2$ )  
162456-58-8, Lithium titanium oxide ( $\text{Li}_{0.2-2}\text{Ti}_{0.8-1.25}\text{O}_2$ )  
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
(complex oxide **cathode** active mass having specific shape for lithium secondary battery)

RN 162456-54-4 HCAPLUS

CN Lithium nickel oxide ( $\text{Li}_{0.2-2}\text{Ni}_{0.8-1.25}\text{O}_2$ ) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ni	0.8 - 1.25	7440-02-0
Li	0.2 - 2	7439-93-2

RN 162456-58-8 HCAPLUS  
CN Lithium titanium oxide ( $\text{Li}_{0.2-2}\text{Ti}_{0.8-1.25}\text{O}_2$ ) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Ti	0.8 - 1.25	7440-32-6
Li	0.2 - 2	7439-93-2

L76 ANSWER 23 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN  
AN 1995:426732 HCAPLUS

DN 122:218571  
 ED Entered STN: 21 Mar 1995  
 TI Secondary nonaqueous lithium batteries with improved  
**cathodes**  
 IN Kubota, Tadahiko  
 PA Fuji Photo Film Co Ltd, Japan  
 SO Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF  
 DT Patent  
 LA Japanese  
 IC ICM H01M0010-40  
 ICS H01M0004-02; H01M0004-58  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy  
 Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 06325791	A2	19941125	JP 1993-113066	19930514

PRAI JP 1993-113066

19930514 &lt;--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06325791	ICM	H01M0010-40
	ICS	H01M0004-02; H01M0004-58
	IPCI	H01M0010-40 [ICM,5]; H01M0010-36 [ICM,5,C*]; H01M0004-02 [ICS,5]; H01M0004-58 [ICS,5]

AB The batteries use **cathodes** composed of a powder having average particle **diameter** 0.01-5.0  $\mu$  m agglomerated into granules having average **diameter** 0.1-15  $\mu$  m. The **cathode** active mass is preferably  $\text{Li}_x\text{M}_y\text{M}'_z\text{O}_w$  (M = Ni, V, or especially Co; M' = Ni, V, Fe, Mn, Ti, B, or P; x = 0.1.apprx.1.5; yr = 0.8.apprx.1.4; z = 0.apprx.0.5; and w = 1.90.apprx.4.2), the electrolyte solvent is propylene carbonate or ethylene carbonate mixed with  $\text{MeOC}_2\text{H}_4\text{OMe}$ , and the Li intercalating anodes is  $\text{LiPAOR}$  (A = Ti, V, Mn, Co, Fe, Nb, and/or Mo; p = 0.apprx.3.1; and r = 1.6.apprx.4.1).

ST battery oxide **cathode** particle size; metal oxide particle size **cathode**

IT **Cathodes**

(battery, controlled particles for **cathode** active oxides in secondary lithium batteries)

IT 12798-95-7 13596-51-5, Cobalt lithium vanadium oxide ( $\text{CoLiVO}_4$ ).  
 RL: DEV (Device component use); USES (Uses)

(anodes for secondary batteries)

IT 12031-65-1, Lithium nickel oxide ( $\text{LiNiO}_2$ ) 12190-79-3, Lithium cobalt oxide ( $\text{LiCoO}_2$ ) 113066-92-5, Cobalt lithium nickel oxide ( $\text{Co}_{0.9}\text{LiNi}_{0.1}\text{O}_2$ ) 118819-39-9, Cobalt lithium manganese oxide ( $\text{Co}_{0.8}\text{LiMn}_{0.2}\text{O}_2$ ) 142447-12-9, Cobalt lithium manganese oxide ( $\text{Co}_{0.95}\text{LiMn}_{0.05}\text{O}_2$ ) 162023-31-6, Cobalt lithium vanadium oxide ( $\text{Co}_{0.96}\text{LiV}_{0.04}\text{O}_2$ ) 162023-32-7, Cobalt lithium vanadium oxide ( $\text{Co}_{0.99}\text{LiV}_{0.01}\text{O}_2$ ) 162023-33-8, Cobalt iron lithium oxide ( $\text{Co}_{0.98}\text{Fe}_{0.02}\text{LiO}_2$ ) 162023-34-9, Cobalt lithium titanium oxide ( $\text{Co}_{0.99}\text{LiTi}_{0.01}\text{O}_2$ )

RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(controlled particles for **cathode** active oxides in secondary lithium batteries)

IT 7782-42-5, Graphite, uses

RL: DEV (Device component use); USES (Uses)

(lithium intercalating anodes for secondary batteries)

IT 12031-65-1, Lithium nickel oxide ( $\text{LiNiO}_2$ )  
 113066-92-5, Cobalt lithium nickel oxide ( $\text{Co}_{0.9}\text{LiNi}_{0.1}\text{O}_2$ )

162023-34-9, Cobalt lithium titanium oxide  
(Co<sub>0.99</sub>LiTi<sub>0.01</sub>O<sub>2</sub>)

RL: DEV (Device component use); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)  
(controlled particles for **cathode** active oxides in secondary lithium batteries)

RN 12031-65-1 HCAPLUS

CN Lithium nickel oxide (LiNiO<sub>2</sub>) (6CI, 8CI, 9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 113066-92-5 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.9</sub>LiNi<sub>0.1</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.9	7440-48-4
Ni	0.1	7440-02-0
Li	1	7439-93-2

RN 162023-34-9 HCAPLUS

CN Cobalt lithium titanium oxide (Co<sub>0.99</sub>LiTi<sub>0.01</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
Co	0.99	7440-48-4
Ti	0.01	7440-32-6
Li	1	7439-93-2

L76 ANSWER 24 OF 29 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1995:290103 HCAPLUS

DN 122:60158

ED Entered STN: 12 Jan 1995

TI Low self discharge secondary nonaqueous batteries

IN Kubota, Tadahiko; Idota, Yoshio

PA Fuji Photo Film Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 21 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01M0010-40

ICS C01G0051-00; H01M0004-02; H01M0004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 06243897	A2	19940902	JP 1993-264994	19931022

PRAI JP 1993-264994 A 19931022 <--  
JP 1992-344512 19921224 <--

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 06243897	ICM	H01M0010-40
	ICS	C01G0051-00; H01M0004-02; H01M0004-58
	IPCI	H01M0010-40 [ICM,5]; H01M0010-36 [ICM,5,C*]; C01G0051-00 [ICS,5]; H01M0004-02 [ICS,5]; H01M0004-58 [ICS,5]
AB		The batteries, using light metals, their alloys, or Li intercalating materials for anodes, use <b>cathode</b> active mass having av particle diam 2.0-9.0 $\mu$ m with $\geq 60$ volume% particles having diameter 1.0-15 $\mu$ m. Preferably, the <b>cathode</b> active mass is Li Co oxide, where part of the Co may be substituted by Ni, V, Fe, Mn, Ti, and/or Cu.
ST		battery lithium low self discharge; <b>cathode</b> lithium cobalt oxide battery
IT		Batteries, secondary (secondary lithium batteries with improved <b>cathodes</b> for low self discharge)
IT		<b>Cathodes</b> (battery, secondary lithium batteries with improved <b>cathodes</b> for low self discharge)
IT		1313-96-8, Niobium pentoxide 7782-42-5, Graphite, uses 12036-22-5, Tungsten dioxide 12615-39-3 13568-36-0, Lithium nickel vanadate (LiNiVO <sub>4</sub> ) 13596-51-5, Lithium cobalt vanadate (LiCoVO <sub>4</sub> ) 18868-43-4, Molybdenum dioxide 160151-95-1, Lithium nickel vanadium oxide (Li <sub>1.75</sub> Ni <sub>0.5</sub> VO <sub>2.4</sub> ) 160151-96-2, Lithium titanium vanadium oxide (LiTi <sub>0.5</sub> VO <sub>2</sub> ) 160151-97-3, Lithium manganese vanadium oxide (LiMn <sub>0.5</sub> VO <sub>2.5</sub> ) 160151-98-4, Iron lithium manganese oxide (Fe <sub>0.5</sub> LiMn <sub>0.5</sub> O <sub>2.1</sub> ) RL: DEV (Device component use); USES (Uses) (lithium intercalating anodes in secondary lithium batteries with improved <b>cathodes</b> for low self discharge)
IT		12190-79-3P, Lithium cobalt oxide (LiCoO <sub>2</sub> ) 118557-77-0P, Cobalt iron lithium oxide (Co <sub>0.7</sub> Fe <sub>0.3</sub> LiO <sub>2</sub> ) 118557-81-6P, Cobalt lithium nickel oxide (Co <sub>0.7</sub> LiNi <sub>0.3</sub> O <sub>2</sub> ) 118819-40-2P, Cobalt lithium manganese oxide (Co <sub>0.7</sub> LiMn <sub>0.3</sub> O <sub>2</sub> ) 124520-34-9P, Cobalt lithium oxide (CoLi <sub>0.97</sub> O <sub>2</sub> ) 136574-95-3P, Cobalt lithium oxide (CoLi <sub>1.102</sub> ) 136574-96-4P, Cobalt lithium oxide (CoLi <sub>1.1502</sub> ) 144815-46-3P, Cobalt lithium oxide (CoLi <sub>1.2502</sub> ) 156098-40-7P, Cobalt lithium oxide (CoLi <sub>1.0502</sub> ) 160125-98-4P, Cobalt lithium oxide (CoLi <sub>0.95-1.302</sub> ) 160151-72-4P, Cobalt lithium oxide (CoLi <sub>0.9502</sub> ) 160151-73-5P, Cobalt lithium vanadium oxide (Co <sub>0.98</sub> Li <sub>0.98</sub> VO <sub>2.0202</sub> ) 160151-74-6P, Cobalt lithium nickel oxide (Co <sub>0.97</sub> Li <sub>0.97</sub> Ni <sub>0.0302</sub> ) 160151-75-7P, Cobalt lithium manganese oxide (Co <sub>0.96</sub> Li <sub>0.93</sub> Mn <sub>0.0402</sub> ) 160151-76-8P, Cobalt lithium titanium oxide (Co <sub>0.9</sub> Li <sub>0.9</sub> Ti <sub>0.102</sub> ) 160151-77-9P, Cobalt iron lithium oxide (Co <sub>0.92</sub> Fe <sub>0.08</sub> Li <sub>0.9502</sub> ) 160151-78-0P, Cobalt copper lithium oxide (Co <sub>0.97</sub> Cu <sub>0.03</sub> Li <sub>0.9502</sub> ) 160151-79-1P, Cobalt lithium oxide (CoLi <sub>1.0802</sub> ) 160151-80-4P, Cobalt lithium vanadium oxide (Co <sub>0.95</sub> Li <sub>1.08</sub> VO <sub>2.0502</sub> ) 160151-81-5P, Cobalt lithium nickel oxide (Co <sub>0.92</sub> Li <sub>1.08</sub> Ni <sub>0.0802</sub> ) 160151-82-6P, Cobalt lithium manganese oxide (Co <sub>0.95</sub> Li <sub>1.02</sub> Mn <sub>0.0502</sub> ) 160151-83-7P, Cobalt lithium titanium oxide (Co <sub>0.93</sub> Li <sub>1.02</sub> Ti <sub>0.0702</sub> ) 160151-84-8P, Cobalt iron lithium oxide (Co <sub>0.98</sub> Fe <sub>0.02</sub> Li <sub>1.0202</sub> ) 160151-85-9P, Cobalt copper lithium oxide (Co <sub>0.91</sub> Cu <sub>0.09</sub> Li <sub>1.0302</sub> ) 160151-86-0P, Cobalt copper lithium oxide (Co <sub>0.98</sub> Cu <sub>0.02</sub> Li <sub>1.0602</sub> ) 160151-87-1P, Cobalt lithium vanadium oxide (Co <sub>0.7</sub> Li <sub>0.97</sub> VO <sub>2.302</sub> ) 160151-88-2P, Cobalt lithium nickel oxide (Co <sub>0.7</sub> Li <sub>0.97</sub> Ni <sub>0.302</sub> ) 160151-89-3P, Cobalt lithium manganese oxide (Co <sub>0.7</sub> Li <sub>0.97</sub> Mn <sub>0.302</sub> ) 160151-90-6P, Cobalt lithium titanium oxide (Co <sub>0.7</sub> Li <sub>0.97</sub> Ti <sub>0.302</sub> ) 160151-91-7P, Cobalt iron lithium oxide (Co <sub>0.7</sub> Fe <sub>0.3</sub> Li <sub>0.9702</sub> ) 160151-92-8P, Cobalt copper lithium oxide (Co <sub>0.7</sub> Cu <sub>0.3</sub> Li <sub>0.9702</sub> ) 160151-93-9P, Cobalt lithium vanadium oxide (Co <sub>0.7</sub> LiVO <sub>2.302</sub> ) 160151-94-0P, Cobalt copper lithium oxide (Co <sub>0.7</sub> Cu <sub>0.3</sub> LiO <sub>2</sub> ) 160151-99-5P, Cobalt lithium oxide (CoLi <sub>1.0302</sub> )

160152-00-1P, Cobalt lithium oxide (CoLi1.01O2)

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(secondary lithium batteries with improved cathodes for low self discharge)

IT 1309-37-1, Ferric oxide, uses

RL: DEV (Device component use); USES (Uses)

( $\alpha$ -; lithium intercalating anodes in secondary lithium batteries with improved cathodes for low self discharge)

IT 13568-36-0, Lithium nickel vanadate (LiNiVO4)

160151-95-1, Lithium nickel vanadium oxide

(Li1.75Ni0.5V0.5O2.4) 160151-96-2, Lithium titanium vanadium oxide (LiTi0.5V0.5O2)

RL: DEV (Device component use); USES (Uses)

(lithium intercalating anodes in secondary lithium batteries with improved cathodes for low self discharge)

RN 13568-36-0 HCAPLUS

CN Lithium nickel vanadium oxide (LiNiVO4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	4	17778-80-2
V	1	7440-62-2
Ni	1	7440-02-0
Li	1	7439-93-2

RN 160151-95-1 HCAPLUS

CN Lithium nickel vanadium oxide (Li1.75Ni0.5V0.5O2.4) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2.4	17778-80-2
V	0.5	7440-62-2
Ni	0.5	7440-02-0
Li	1.75	7439-93-2

RN 160151-96-2 HCAPLUS

CN Lithium titanium vanadium oxide (LiTi0.5V0.5O2) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	2	17778-80-2
V	0.5	7440-62-2
Ti	0.5	7440-32-6
Li	1	7439-93-2

IT 118557-81-6P, Cobalt lithium nickel oxide (Co0.7LiNi0.3O2)

160151-74-6P, Cobalt lithium nickel oxide

(Co0.97Li0.97Ni0.03O2) 160151-76-8P, Cobalt lithium

titanium oxide (Co0.9Li0.9Ti0.1O2) 160151-81-5P, Cobalt

lithium nickel oxide (Co0.92Li1.08Ni0.08O2) 160151-83-7P,

Cobalt lithium titanium oxide (Co0.93Li1.02Ti0.07O2)

160151-88-2P, Cobalt lithium nickel oxide

(Co0.7Li0.97Ni0.3O2) 160151-90-6P, Cobalt lithium titanium oxide (Co0.7Li0.97Ti0.3O2)

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(secondary lithium batteries with improved cathodes for

low self discharge)

RN 118557-81-6 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.7</sub>LiNi<sub>0.3</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.7	7440-48-4
Ni	0.3	7440-02-0
Li	1	7439-93-2

RN 160151-74-6 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.97</sub>Li<sub>0.97</sub>Ni<sub>0.03</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.97	7440-48-4
Ni	0.03	7440-02-0
Li	0.97	7439-93-2

RN 160151-76-8 HCAPLUS

CN Cobalt lithium titanium oxide (Co<sub>0.9</sub>Li<sub>0.9</sub>Ti<sub>0.1</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.9	7440-48-4
Ti	0.1	7440-32-6
Li	0.9	7439-93-2

RN 160151-81-5 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.92</sub>Li<sub>1.08</sub>Ni<sub>0.08</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.92	7440-48-4
Ni	0.08	7440-02-0
Li	1.08	7439-93-2

RN 160151-83-7 HCAPLUS

CN Cobalt lithium titanium oxide (Co<sub>0.93</sub>Li<sub>1.02</sub>Ti<sub>0.07</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.93	7440-48-4
Ti	0.07	7440-32-6
Li	1.02	7439-93-2

RN 160151-88-2 HCAPLUS

CN Cobalt lithium nickel oxide (Co<sub>0.7</sub>Li<sub>0.97</sub>Ni<sub>0.3</sub>O<sub>2</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
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O	2	17778-80-2
Co	0.7	7440-48-4
Ni	0.3	7440-02-0
Li	0.97	7439-93-2

RN 160151-90-6 HCAPLUS

CN Cobalt lithium titanium oxide (Co<sub>0.7</sub>Li<sub>0.97</sub>Ti<sub>0.302</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	2	17778-80-2
Co	0.7	7440-48-4
Ti	0.3	7440-32-6
Li	0.97	7439-93-2

L76 ANSWER 25 OF 29 JAPIO (C) 2006 JPO on STN

AN 2003-257428 JAPIO

TI NONAQUEOUS SECONDARY BATTERY

IN WADA HIROSHI

PA JAPAN STORAGE BATTERY CO LTD

PI JP 2003257428 A 20030912 Heisei

AI JP 2002-53526 (JP2002053526 Heisei) 20020228

PRAI JP 2002-53526 20020228

SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2003

IC ICM H01M0004-58

ICS H01M0004-02; H01M0010-40

AB PROBLEM TO BE SOLVED: To provide a nonaqueous secondary battery which has large energy density per unit volume and satisfactory life performance.

SOLUTION: This nonaqueous secondary battery uses particles, as a positive **electrode** active material, which are formed by flocculating the primary particles of a lithium manganese **compound oxide** and the **primary particles** of a **lithium nickel** compound oxide, the average diameter of the primary particles of the lithium manganese compound oxide being larger than that of the **lithium nickel** compound oxide.

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L76 ANSWER 26 OF 29 JAPIO (C) 2006 JPO on STN

AN 2003-208895 JAPIO

TI **LITHIUM-NICKEL COMPOUND OXIDE**FOR **LITHIUM SECONDARY BATTERY POSITIVE****ELECTRODE ACTIVE MATERIAL, MANUFACTURING METHOD THEREOF AND****LITHIUM SECONDARY BATTERY USING THE SAME**

IN TAKEUCHI YOJI; UKIYOU YOSHIO

PA TOYOTA CENTRAL RES &amp; DEV LAB INC

PI JP 2003208895 A 20030725 Heisei

AI JP 2002-5036 (JP2002005036 Heisei) 20020111

PRAI JP 2002-5036 20020111

SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2003

IC ICM H01M0004-58

ICS C01G0053-00; H01M0004-02; H01M0010-40

AB PROBLEM TO BE SOLVED: To provide a lithium secondary battery possible to restrict the capacity deterioration and a rise of the internal resistance even in the case of storing the battery for a long time in the high charge rate condition, to provide a lithium-nickel compound oxide for the positive **electrode** active material capable of realizing such a lithium secondary battery, and to provide a simple manufacturing method thereof.

SOLUTION: This lithium-nickel compound oxide has a basic composition expressed with  $\text{LiNiO}_{2-x}$  and has the hexagonal system layered rock salt structure, and a part of the lithium site and a part of the nickel site is substituted with magnesium. A manufacturing method thereof contains a raw material solution adjusting process, a first hydroxide precipitation process, a second hydroxide precipitation process, and a burning process.

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L76 ANSWER 27 OF 29 JAPIO (C) 2006 JPO on STN  
 AN 2002-008658 JAPIO  
 TI LITHIUM TITANIUM COMPOUND  
 OXIDE FOR LITHIUM SECONDARY BATTERY  
 ELECTRODE ACTIVE MATERIAL, AND ITS MANUFACTURING METHOD  
 IN TAKEUCHI YOJI; UKIYOU YOSHIO  
 PA TOYOTA CENTRAL RES & DEV LAB INC  
 PI JP 2002008658 A 20020111 Heisei  
 AI JP 2000-192985 (JP2000192985 Heisei) 20000627  
 PRAI JP 2000-192985 20000627  
 SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2002  
 IC ICM H01M0004-58  
 ICS C01G0023-00; H01M0010-40  
 AB PROBLEM TO BE SOLVED: To provide a lithium titanium compound oxide for an electrode active material which can constitute a lithium secondary battery which is excellent in output characteristics, further excellent in durability such as cycle characteristics and preservation characteristics or the like, especially in durability under high temperature, and a method for easily manufacturing its lithium titanium compound oxide.  
 SOLUTION: The lithium titanium compound oxide is made to be expressed with a composition formula  $\text{Li}_x\text{Ti}_y\text{O}_4$  ( $0.5 \leq x \leq 3$ ,  $1 \leq y \leq 2.5$ ), and to be observed in a shape of a rectangle with an electron microscope, and to have an average grain size of its grains of 0.2  $\mu\text{m}$  or more and 50  $\mu\text{m}$  or less. Moreover, the manufacturing method has a method in which, after mixing a first lithium compound, a titanium oxide, and the second lithium compound, the mixture is baked at a temperature of 1000 $^{\circ}\text{C}$  or below put above.  
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L76 ANSWER 28 OF 29 JAPIO (C) 2006 JPO on STN  
 AN 2001-256975 JAPIO  
 TI LITHIUM NICKEL COMPOUND OXIDE  
 FOR LITHIUM SECONDARY BATTERY POSITIVE  
 ELECTRODE ACTIVE MATERIAL, MANUFACTURING METHOD THEREOF, AND  
 LITHIUM SECONDARY BATTERY USING THE SAME  
 IN TAKEUCHI YOJI; UKIYOU YOSHIO  
 PA TOYOTA CENTRAL RES & DEV LAB INC  
 PI JP 2001256975 A 20010921 Heisei  
 AI JP 2000-70905 (JP2000070905 Heisei) 20000314  
 PRAI JP 2000-70905 20000314  
 SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2001  
 IC ICM H01M0004-58  
 ICS C01G0053-00; H01M0010-40  
 AB PROBLEM TO BE SOLVED: To provide a method for manufacturing a lithium nickel compound wherein a part of Ni site is substituted with Mn in which uniformity of the composition of the lithium nickel compound oxide can be maintained, and to use the lithium nickel compound oxide produced with the manufacturing method as a cathode active material so as to obtain a lithium secondary battery having high capacity and an excellent cycle characteristics especially when used at high temperature.



SOLUTION: Ni and Mn as an essential substituted element are separated out in a compound hydroxide by liquid-phase reaction method (precipitation method). Then mixing a lithium compound in this compound hydroxide and calcining and forming the mixed raw materials, the lithium nickel compound oxide is produced. The lithium nickel compound oxide product in this manner is used as a **cathode** active material and composing a lithium secondary battery.

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L76 ANSWER 29 OF 29 JAPIO (C) 2006 JPO on STN  
 AN 2001-243952 JAPIO  
 TI LITHIUM SECONDARY BATTERY  
 IN TAKEUCHI YOJI; OKUDA NARUAKI; NAKANO HIDEYUKI; KOBAYASHI TETSUO;  
 SASAKI ITSUKI; MUKAI KAZUHIKO; UKIYOU YOSHIO  
 PA TOYOTA CENTRAL RES & DEV LAB INC  
 PI JP 2001243952 A 20010907 Heisei  
 AI JP 2000-53747 (JP2000053747 Heisei) 20000229  
 PRAI JP 2000-53747 20000229  
 SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2001  
 IC ICM H01M0004-58  
 ICS H01M0010-40  
 AB PROBLEM TO BE SOLVED: To provide a lithium secondary battery, which is of low cost and excellent in cycle characteristics and, especially, in the cycle characteristics in hot environment and hot temperature preservation characteristics.  
 SOLUTION: The lithium secondary battery is composed of a positive **electrode** containing for its positive **electrode** active material a **lithium nickel compound oxide** of **secondary particles** which have been formed by being coagulated with a primary particle as expressed in a chemical formula  $Li_{1-x}A_xNi_{2-y}MyO_2$  (wherein, A is one or more selected from alkaline metal, and alkaline earth metal excluding Li; M is one or more selected from Co, Mn, Al, Cr, Fe, V, Ti, and Ga;  $0 \leq x \leq 0.2$ ;  $0.05 \leq y \leq 0.5$ ) with an average particle size of  $0.5 \mu m$  or more, and a negative **electrode** containing for its negative **electrode** active material a lithium titan compound oxide as expressed in the chemical formula  $Li_aTi_bO_4$  ( $0.5 \leq a \leq 3$ ,  $1 \leq b \leq 2.5$ ).  
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